

# Stimulating sustainability among students at the Radboud University

A study about the factors influencing the pro-environmental behaviour of students at the Radboud University

Fleur Somsen

MASTER'S THESIS FOR THE ENVIRONMENT AND SOCIETY  
STUDIES PROGRAMME

NIJMEGEN SCHOOL OF MANAGEMENT

RADBOD UNIVERSITY NIJMEGEN  
NOVEMBER 2020

# Stimulating sustainability among students at the Radboud University

**Fleur Somsen**

Environment and Society Studies

Specialisation: Local environmental change and sustainable cities

Nijmegen School of Management

Radboud University Nijmegen

November 2020

## **Author**

Fleur Somsen

S4579232

## **Internal supervisor**

Dr. Rikke Arnouts

Wageningen University

## **External supervisor**

Drs. Guido van Gemert

Occupational Health and Safety and Environmental service (Arbo- en Milieudienst) Radboudumc

Keywords: Pro-environmental behaviour, environmental knowledge, education for sustainable development, knowledge-to-action gap, theory of planned behaviour

## Summary

The growing pressure on the Earth's resources calls for a change to sustainable development. Education is argued to play a vital role in the switch towards this sustainable future and Education for Sustainable Development is aimed at providing their students with the right knowledge and skills to achieve this sustainable future. However, a knowledge-to-action gap is visible, where knowledge does not seem to lead to pro-environmental behaviour, because environmental knowledge is not thought to be action-oriented enough. Therefore, this research is aimed at dissecting the various factors that influence the pro-environmental behaviour of students of the Radboud University, in order to gain a better understanding of which factors can be used to strengthen the pro-environmental behaviour of students. Subsequently, the factors that influence the pro-environmental behaviour of students will be compared to the sustainably oriented activities of the Radboud University, to discover the similarities and discrepancies. The main research question is therefore formulated as: *To what extent does the pro-environmental behaviour of students of the Radboud University, regarding reducing meat consumption and separating waste, correspond with the sustainably oriented actions of the Radboud University?*

The conceptual model used for determining pro-environmental behaviour is mainly based on Ajzen's theory of planned behaviour, which assumes that intention is the biggest predictor of pro-environmental behaviour. In turn, the factors attitude, subjective norm and perceived behavioural control together are assumed to influence this intention. As mentioned in the academic literature on determining pro-environmental behaviour there might be an influence of the factors environmental knowledge, environmental concern, actual control, and values. These factors are included into the conceptual model and form the hypothetical basis for determining pro-environmental behaviour. The Radboud University is thought to influence their students through formal-, informal-, and campus curriculum.

The information that was necessary for testing the hypotheses was gathered through a survey which asks students of the Radboud University about their behaviour on reducing meat consumption and separating waste. This information was processed and the relations between the factors were determined by multiple regression analysis. The information regarding the role of the Radboud University in influencing the pro-environmental behaviour of students was gathered through in-depth interviews.

The most important factors that influence the pro-environmental behaviour of students are subjective norm and perceived behavioural control. In addition, action-related knowledge and environmental

concern play a role in influencing the pro-environmental behaviour of students at the Radboud University. The Radboud University predominantly aims at providing the possibility for students to engage in pro-environmental behaviour, by providing vegetarian meals and waste separation units throughout the university campus. In addition, they provide the necessary information on how students need to act environmentally responsible.

The most important finding of this thesis is that the Radboud University is already influencing important factors which influence the pro-environmental behaviour of students, such as: environmental knowledge, perceived behavioural control, actual control and environmental concern. However, subjective norm is the most important predictor of pro-environmental behaviour of students, but this factor is not included in the sustainably oriented actions of the Radboud University. The role of knowledge is applied when stimulating the separation of waste, but not when aiming at stimulating students to reduce their meat consumption. Therefore, this thesis recommends that the Radboud University improves their distribution of action-related knowledge regarding the reduction of meat consumption, and invests in focussing on the subjective norm, when aiming to increase the pro-environmental behaviour of students.

## *Preface*

In front of you lies the master thesis “Stimulating sustainability among students at the Radboud University”. This thesis is the last step to fulfil the master Environment and Society studies at the Radboud University Nijmegen. The thesis is aimed at exploring the factors influencing the pro-environmental behaviour of the students at the Radboud University and matching these to the sustainably oriented activities at the Radboud University. With this information, this thesis aims to provide recommendations for this university on how to support this pro-environmental behaviour among students.

With this thesis, I got the opportunity to explore my interests in the field of sustainability and society. Throughout my bachelor Human geography, Spatial planning and Environment, and my master Environment and Society studies, the behaviour of people increasingly started to interest me. This, in combination with my interest in sustainability and education, has led to the topic of pro-environmental behaviour of students. I really enjoyed researching something new and exploring the field and literature of behaviour change.

One of the methods of this thesis, the survey, and the analyses through SPSS were still quite unfamiliar to me. Even though this inexperience did cause a slight delay in my thesis, it was still enjoyable to figure out new things and learn about quantitative methods. The process of writing this thesis has taught me a lot about myself and increased my confidence, and widened my interests. I take pride in finishing my master with this thesis as its end product.

I really want to thank my thesis supervisor, Rikke Arnouts, for allowing me to explore my interests and helping me by providing feedback and tips. Secondly, I want to thank Guido van Gemert, for his support, ideas and feedback and the freedom of finding a topic that at the same time interested me and could be of use for the Radboud University. This freedom and trust have helped me to find the topic that best suited me. Lastly, I want to thank my family and friends, and especially my boyfriend for the support and guidance. I hope you enjoy reading this thesis.

Fleur Somsen

Nijmegen, November 2020

# Content

Summary .....	i
Preface.....	iii
1. Introduction.....	1
1.1 Research problem statement.....	1
1.2 Research aim and research question .....	3
1.3 Scientific and societal relevance .....	4
1.3.1 Scientific relevance.....	4
1.3.2 Societal relevance.....	5
1.4 Reading guide .....	6
2. Theoretical framework.....	7
2.1 Pro-environmental behaviour and its predictors.....	7
2.1.1 Defining pro-environmental behaviour.....	7
2.1.2 Theoretical frameworks to explain pro-environmental behaviour.....	7
2.1.3 Factors influencing pro-environmental behaviour.....	10
2.1.4 Knowledge and pro-environmental behaviour .....	12
2.2 The role of higher education in influencing pro-environmental behaviour.....	14
2.2.1 Education for sustainable development .....	14
2.2.2 The ways education can influence pro-environmental behaviour.....	15
2.3 Conceptual model and hypotheses.....	17
2.4 Operationalisation.....	20
3. Methods .....	22
3.1 Research philosophy .....	22
3.2 Research strategy .....	24
3.2.1 Research object .....	25
3.2.2 Survey .....	25
3.2.3 Case study.....	26
3.3 Research methods.....	26
3.3.1 Literature study .....	26
3.3.2 Questionnaire.....	26
3.3.3 Interviews for depth.....	27
3.4 Measuring theoretical concepts.....	28
3.5 Data analysis.....	31
3.5.1 Reliability of the measuring instrument.....	31
3.5.2 Multiple regression analysis .....	32
3.6 Validity and reliability of the research .....	33
4. Results .....	35

4.1 General outcomes of the questionnaire .....	35
4.1.1 Reducing meat consumption.....	35
4.1.2 Separating waste .....	38
4.1.3 Comparing the two behaviours.....	41
4.2 Correlations .....	42
4.2.1 Reducing meat consumption.....	42
4.2.2 Separating waste .....	44
4.3 Regression analysis.....	45
4.3.1 Reducing meat consumption.....	46
4.3.2 Separating waste .....	47
4.3.3 Regression conclusion .....	48
4.4 Sustainable oriented activities and facilitation of the Radboud University .....	50
4.4.1 Sustainability within formal curricula.....	50
4.4.2 Sustainability within informal curricula.....	51
4.4.3 Sustainability within campus curricula.....	51
4.4.4 Stimulating sustainable behaviour of students.....	52
4.4.5 Reducing meat consumption and separating waste .....	53
4.5 Match between PEB of students and the sustainability-oriented activities of the Radboud University.....	55
5. Conclusion and recommendations.....	56
5.1 Conclusion .....	56
5.2 Recommendations.....	59
6. Discussion .....	60
6.1 Theoretical reflection .....	60
6.2 Methodological reflection .....	61
6.3 Suggestions for future research .....	62
References.....	63
Appendix I: Survey questions .....	69
Appendix II: Assumptions regression analysis.....	75
Reducing meat consumption .....	75
Separating waste .....	79
Appendix III: Multiple regression .....	86
Reducing meat consumption .....	86
Separating waste .....	89

# 1. Introduction

The first chapter of this thesis introduces the research problem and explains how this problem materializes. In addition, the context and concepts surrounding this problem will be discussed. This research problem results in the research aim and research question, which will be answered throughout this thesis. Finally, the scientific and societal relevance of this problem will be explained.

## 1.1 Research problem statement

In 1972 the Club of Rome called in their report *Limits to growth* for a worldwide realization that earth's limited resources will be incapable to sustain consumption rates much beyond the year 2100, under the current rate of economic and demographic growth (Meadows, Meadows, Randers, & Behrens, 1972). The authors speak gravely about the future, but at the same time aim to instil hope when they offer an alternative outcome, through their depiction of a society that lives in harmony with earth's resources. This balance can be achieved when society imposes limits on the production of material goods, and thus, limits to growth. Building on the statements of the Club of Rome, the authors of the Brundtland report of 1987 first mentioned the importance of sustainable development as an alternative for the still emerging growth. They defined sustainable development as "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*", by which they mean to provide society with a better explanation of what is needed to live in terms of sustainability (Brundtland, Khalid, Agnelli, Al-Athel, & Chidzero, 1987).

According to the UNECE (2012, p. 6) "*education should play an important role in enabling people to live together in ways that contribute to sustainable development*". The role of education as a key agent for sustainable development has started in 1990, when the presidents, chancellors and rectors of twenty-two universities from all over the world signed the Talloires Declaration, stating their deep concerns about the rates of environmental pollution and degradation, and the depletion of natural resources. According to them, urgent actions are needed to address these problems and to reverse the trends. To achieve reversion and implement action, universities have a major role in education, research and information exchange. Universities should initiate the change towards sustainability by creating awareness of environmentally sustainable development, educate for environmentally responsible citizenship, and promote environmentally literacy for all. Since 1990, this declaration has been signed by over 500 university leaders from over fifty countries (UNESCO, 1990).

The United Nations declared the period 2005-2014 a Decade of Education for Sustainable Development to reorient educational programs towards sustainability. To reach this goal, the principles, values, and practices of sustainable development are aimed to be integrated in education



(UNESCO, 2014). Nonetheless, while the primary goal of education was to promote sustainable behaviour (Braun and Dierkes, 2019), and eleven percent of the Dutch study programs are focused on sustainability (Het Groene Brein, 2015), the lifestyles of most people still have not become sustainable (Thøgersen, 2005; O'Brien, 2012). Greenhouse gas emissions are still rising at higher rates than ever before, more species are threatened, and food and water security is becoming more problematic (O'Brien, 2012). O'Brien (2012) states, however, that society has enough knowledge of the environmental risks to take action and that there is a wealth of knowledge of the solutions that can promote sustainability. In addition, numerous studies conclude that a shift to a more sustainable society is technically possible. Thøgersen and Schrader (2012) address this phenomenon as the knowledge-to-action gap, *"a huge gap between the available knowledge about sustainable consumption and real action towards it, at all levels of society"* (Thøgersen & Schrader, 2012, p. 2).

To illustrate the knowledge-to-action gap, a study about the sustainable behaviour of Dutch citizens shows that highly educated people in the Netherlands show a higher concern for the environment, talk about what they can do to protect this environment, and vote for more sustainable parties, yet still having a higher carbon footprint than lower educated people. This study shows that highly educated people are more aware of the consequences of their actions and even feel guilty about these actions, but in most cases do little to change their lifestyle (Kanne, van Hofweegen, Kooiman, & van Engeland, 2019). In a similar study, UK students that had received significant education on sustainability, found sustainability to be important, whilst simultaneously demonstrating a lack of understanding of the concept of sustainability, and thereby also lacked the behaviour that coexists with these values (Chaplin & Wyton, 2014). Thus, students are not yet changing their behaviour and adopting a sustainable lifestyle, despite the fact that attention to sustainability in education has increased enormously during the last thirty years.

Kollmuss and Agyeman (2002) point out that increases in knowledge often do not sufficiently lead to sustainable behaviour, or as they define it, pro-environmental behaviour. This statement is also made in research pertaining to sustainable education specifically (Chaplin & Whyton, 2014; Summers & Cutting, 2016; Zsóka, Szerényi, Széchy, & Kocsis, 2013). Zsóka et al. (2013) state that simply transferring knowledge is not enough when trying to adapt the behaviour of students via sustainable education. There is, however, another way for educational institutions to impact students aside from the transferral of knowledge, namely by *"providing examples and shaping the school as a social setting"* (Zsóka et al., 2013, p. 127). Summers and Cutting (2016) elaborate on this by saying that there is a difference between education about sustainability and education for sustainability. The former refers to the development of awareness and is more theoretically focussed, while the latter implies that

education is used to achieve outcomes in behaviour and practice. This suggests that in order to adapt the behaviour of students, education has to focus more on the practical side of education.

In order to better understand how pro-environmental behaviour of students can be empowered by educational institutions, the focus of this thesis will be twofold. On the one hand, it focusses on the pro-environmental behaviour of students and which factors influence them to adopt a more sustainable behaviour. On the other hand, it focusses on the actions that educational institutes take regarding the empowerment of their students to take on a more sustainable lifestyle and thereby increasing their pro-environmental behaviour. In order to look for similarities and discrepancies, the behaviour of students and the actions of educational institutes will be compared to each other.

### **1.2 Research aim and research question**

This thesis will focus on the students and actions of the Radboud University in Nijmegen. The motivation for this choice will be given in chapter three. The aim of this research is to explore how sustainable initiatives, by which educational institutions attempt to stimulate pro-environmental behaviour, correspond to and conflict with the actual pro-environmental behaviour of students. In order to better understand where discrepancies and similarities occur, it is useful to analyse the pro-environmental behaviour of students and determine the factors which drive and obstruct the performance of the pro-environmental behaviour of students. In addition, this thesis aims to study the various activities oriented towards sustainability which the Radboud University partakes in. The sustainability-oriented activities by the Radboud University and pro-environmental behaviour of students are eventually compared to each other in order to explore similarities and discrepancies. Finally, this thesis aims to provide the Radboud University with recommendations that will help empower their students to engage in pro-environmental behaviour, based on the outcomes of this research.

Main research question:

*To what extent does the pro-environmental behaviour of students of the Radboud University, regarding reducing meat consumption and separating waste, correspond with the sustainably oriented actions of the Radboud University?*

Sub-questions:

1. *What are the factors influencing this pro-environmental behaviour of students on the Radboud University?*

In order to get better insights into how the pro-environmental behaviour of students can be influenced, it is useful to understand the full body of factors influencing the pro-environmental

behaviour of students. This will be achieved by researching the existing information on pro-environmental behaviour, and by researching existing theories to explain the drivers of pro-environmental behaviour.

2. *What is the degree of pro-environmental behaviour of students on the Radboud University regarding reducing meat consumption and separating waste?*

Based on the information obtained in the first sub-question, the second sub-question will determine which of the factors that are mentioned in the theory, apply to influencing the pro-environmental behaviour of students of the Radboud University specifically. Here, the pro-environmental behaviour of students is focussed on merely two kinds of specific pro-environmental behaviour, namely, reducing meat consumption and separating waste. The motivation for this choice will be elaborated upon in chapter three.

3. *In what ways does the Radboud University try to stimulate the pro-environmental behaviour of her students?*

The third sub-question will go further into sustainable oriented activities by the Radboud University. To answer this question, the broad views of the Radboud University on sustainability will be examined, and in addition, the focus will be on the specific actions made by the Radboud University geared towards stimulating students to act pro-environmentally.

4. *To what extent do the factors that influence the pro-environmental behaviour of students match the sustainable oriented activities of the Radboud University?*

The fourth sub-question is constructed to research to what degree the pro-environmental behaviour of students and the sustainability-oriented activities of the Radboud University correspond, thereby stipulating where similarities and discrepancies exist

### **1.3 Scientific and societal relevance**

#### **1.3.1 Scientific relevance**

The growing amount of research and information about environmental problems create more awareness and concern about environmental issues throughout the population (Blake, 1999). However, Stern, Dietz, Ruttan, Socolow, and Sweeney (1997) address a limited attention for economic, social, cultural and institutional processes that cause environmental changes. They argue for more research in two areas: *“the particular human choices and actions most responsible for adverse changes in the biophysical environment and the potential for addressing the threats by affecting those choices and actions”* (Stern et al., 1997, p. 2). In addition, Lundholm (2019) argues that not enough attention

is paid to the ways in which various forms of knowledge influence pro-environmental behaviour within the literature pertaining to influencing behaviour. Taking this into account, this thesis will focus on the pro-environmental behaviour of students and will elaborate on how this pro-environmental behaviour can be empowered.

Many studies have been carried out about the pro-environmental behaviour of people in general and about which factors can influence this behaviour (Kollmuss & Agyeman, 2002). Much less research, however, is conducted on pro-environmental behaviour and environmental knowledge of university students as a group. When investigating the role of universities in their contribution to sustainability, according to Nejati and Nejati (2013), it is important to understand perceptions of major stakeholders of the university. However, there is a dearth of studies investigating these stakeholders, and especially there are not many studies addressing the perspective of students, while they are presumably the most important stakeholder. Therefore, this thesis focusses specifically on university students.

In addition, most of the research aimed at understanding the predictors of pro-environmental behaviour focus on only a few predictors of pro-environmental behaviour, for instance, the role of years on campus (Meyer, 2016), environmental knowledge (Vincente-Molina, Fernández-Sáinz, & Izagirre-Olaizola, 2013; Zsóka et al., 2013), their understanding of sustainable living (Chaplin & Wyton, 2014), cultural differences (Cordano, Welcomer, Scherer, Pradenas, & Parada, 2010), and environmental awareness (Oğuz, Çakci, & Kavas, 2010). These studies examine the influence of these predictors on pro-environmental behaviour, but there is no broad research that integrates all of the most used predictors of pro-environmental behaviour among students. Moreover, only one study originates from the Netherlands, with most of the studies being from outside of Europe. This Dutch study, however, researched secondary education from twenty years ago (Kuhlemeier, Van den Brergh, & Lagerweij, 1999). Therefore, this thesis aims to provide a more relevant contribution to the field of predictors of pro-environmental behaviour among university students in the Netherlands.

### **1.3.2 Societal relevance**

The younger generations of this society are, and will increasingly be, most certainly affected by environmental problems, so they need to obtain accurate environmental knowledge, skills and values that will make them able to contribute to an environmentally sustainable world (Vincente-Molina et al., 2013). Since the citizens and policymakers of the future are being shaped at the higher education, this education needs to provide them with the necessary skills to achieve a sustainable society (Lambrechts, Van den Haute, & Vanhoren, 2009). According to Vincente-Molina et al. (2013) universities train their students to fulfil important social roles. University students are *“the leaders, policy makers, scientists, consumers, researchers, and entrepreneurs of the future, and as such the*

*future decisions makers*” (Vincente-Molina et al., 2013, pp. 130-131). Several authors stress that universities could, and therefore should, play a critical role in the transition towards a more sustainable society. (Blok, Wesselink, Studynka, & Kemp, 2015; Zsóka et al., 2013; Nejati & Nejati, 2013).

However, in order for universities to become sustainability leaders, they need to understand the needs of present and future generations, and that with this knowledge and understanding, students can be more effectively educated by professors and make a transition to a more sustainable world. So, understanding the needs of students will help professors to educate them more effectively (Lozano, Lukman, Lozano, Huisingh, & Lambrechts, 2013). For universities to contribute to a more sustainable society, it is therefore important to understand the attitudes and behaviour students have towards the environment (Zsóka et al., 2013), they need to understand the nature and causes of their environmentally disruptive activities (Stern et al., 1997), and in addition it is important to find effective ways to influence students’ behaviour through education (Zsóka et al., 2013). Considering these statements, this thesis aims to better understand the way in which universities can empower students to act more pro-environmentally.

#### **1.4 Reading guide**

The research question stated earlier will be answered during this thesis. To get more information on the topic and concepts involved and related to the research question, chapter two will provide a literature review of the relevant concepts regarding the research question and in addition, provides insight in the theoretical basis for pro-environmental behaviour. The literature and theories will describe the way pro-environmental behaviour materializes among people, and what causes pro-environmental behaviour. In addition, this chapter aims to describe the way in which universities can influence the pro-environmental behaviour of their students. At the end of this chapter, a conceptual model and hypotheses have been created, to guide answering the research question. Chapter three will address the methodological reasoning of this thesis and will explain the research strategy and methods. This chapter will also introduce the case study used for this thesis. Chapter four will, with guidance of the conceptual model and the research questions, process the research results. The results of the questionnaire and the interviews will be discussed, and the proposed hypotheses will be tested through regression analysis. Chapter five, the conclusion, will summarize the outcomes of chapter four and will conclude by answering the main research question. In addition, the latter part of this chapter will be focussed on the recommendations which can be derived from this research. Chapter six will discuss the stated conclusions and will also discuss the limitations of the conducted research and recommend on topics for further research.

## 2. Theoretical framework

This chapter will provide the theoretical basis for answering the main research question of this thesis. In order to do so, this chapter is divided into two sections. The first section will focus on specifically answering the first sub-question: *“What are the factors influencing this pro-environmental behaviour of students on the Radboud University?”*. This section elaborates on the pro-environmental behaviour of students and the theories explaining and causing this behaviour. The latter section describes the role of higher education and how this education is able to influence the pro-environmental behaviour of students. This chapter concludes with a conceptual model, illustrating the predictors of the pro-environmental behaviour of students, and how higher education can influence these predictors.

### 2.1 Pro-environmental behaviour and its predictors

#### 2.1.1 Defining pro-environmental behaviour

In order to understand why people do or do not engage in pro-environmental behaviour, it is useful to elaborate on the definition and concept of pro-environmental behaviour. Kollmuss and Agyeman define pro-environmental behaviour as *“behavior that consciously seeks to minimize the negative impact of one’s actions on the natural and built world”* (2002, p. 240). Steg and Vlek build on this definition and add something by referring to pro-environmental behaviour as *“behavior that harms the environment as little as possible, or even benefits the environment”* (2009, p. 309). The definition of Sterns’ environmentally significant behaviour is related to the pro-environmental behaviour mentioned above: *“the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself”* (Stern, 2000, p. 408). He states that environmental protection has only recently become a part of human decision making. Therefore, environmentally significant behaviour can also be seen as *“the intention to change the environment”* (Stern, 2000, p. 408).

Monroe (2003) distinguishes two different ways to categorise pro-environmental behaviour, direct and indirect pro-environmental behaviour. Direct pro-environmental behaviour can be driving a hybrid vehicle and indirect pro-environmental behaviour refers to changing the policy in order to make hybrid vehicles more affordable (Monroe, 2003). In addition, pro-environmental behaviour can operate at the individual level, by making your own garden bee and insect friendly, or at the societal level, where neighbours together organise a habitat improvement event (Monroe, 2003).

#### 2.1.2 Theoretical frameworks to explain pro-environmental behaviour

Over the past thirty years, the environmental psychology literature has attempted to explore factors that influence the pro-environmental behaviour of people in order to manipulate it in the desired ways (Blok et al., 2015). This attempt resulted into three theoretical frameworks which try to explain the

ways through which someone decides to exhibit pro-environmental behaviour (Inoue & Alfaro-Barrantes, 2015). These three theoretical frameworks are the theory of reasoned action, the theory of planned behaviour and the value-belief-norm theory.

The theory of reasoned action (TRA), constructed by Ajzen and Fishbein (1980), states that the decision of someone to engage in a behaviour is determined by the intention of this individual to engage in that certain behaviour. Assuming this statement to be true, the TRA focusses on identifying the determinants of these behavioural intentions (Ajzen & Fishbein, 1980). Ajzen and Fishbein (1980) focus in their research on attitude and subjective norm as determinants of behavioural intention. The first factor, attitude towards the behaviour, refers to someone's consideration to engage in a specific behaviour. When someone has a positive attitude towards something, the intention to engage in that specific behaviour will increase. The second factor, subjective norm, is someone's perception of whether society expects him or her to show a certain behaviour. These factors are influenced by specific beliefs of people. Attitude towards the behaviour is determined by behavioural beliefs, which refers to the beliefs about the positive and negative consequences people experience when performing a certain behaviour. In turn, the subjective norm gets determined by the normative beliefs. These are the beliefs that important persons in their lives would approve or disapprove of the behaviour these individuals are performing (Ajzen & Fishbein, 1980).

The theory of planned behaviour (TPB) elaborates on the theory of reasoned action, where the theory of planned behaviour tries to overcome the limitations of the theory of reasoned action (Ajzen, 1991). The major difference between the TRA and the TPB is that the factor perceived behavioural control (PBC) is added to the theory of planned behaviour (Ajzen, 1991). This PBC "*refers to people's perception of the ease or difficulty of performing the behavior of interest*" (Ajzen, 1991, p. 183). Factors that can influence this perceived behavioural control are money, time, and skills (Ajzen, 1991). For instance, if an individual thinks that he has enough time to catch a train, he will try to be on time. However, when he or she believes he will never make it in time, this individual will not try to catch that specific train. It is important to stress that this variable does not refer to the actual control of the individual, but to the control these individual beliefs he or she has. As visualized in figure 1, specific beliefs that a person possesses influence the factors attitude, subjective norm, and perceived behavioural control. These factors, in turn determine the intention to engage in the specific behaviour. If this person has the necessary abilities and if there are no obstacles to perform the specific behaviour, intention should lead to behaviour. Therefore, influencing or changing behaviour can only be accomplished by influencing or changing the beliefs of people (Yzer, 2013).

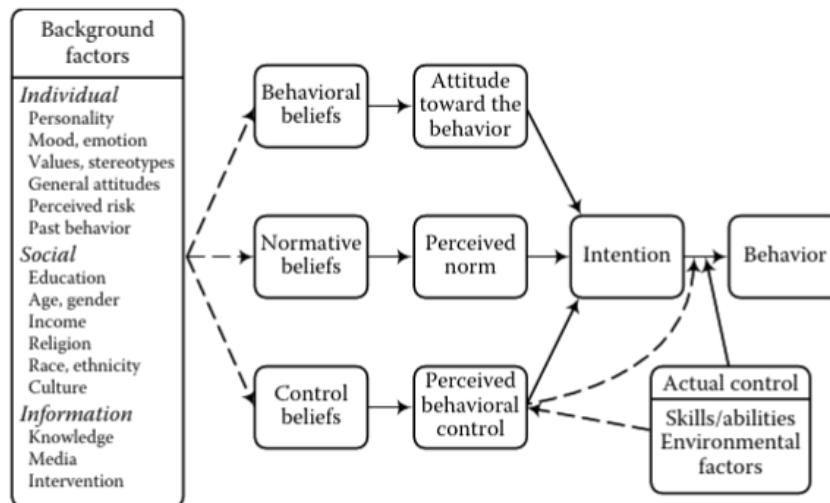


FIGURE 1: THEORY OF PLANNED BEHAVIOUR (FISHBEIN & AJZEN, 2011)

Lastly, the value-belief-norm theory of Stern, Dietz, Abel, Guagnano, and Kalof (1999) explains pro-environmental behaviour as a function of values, beliefs, and norms. This theory states that pro-environmental actions are a response to personal moral norms about those actions. So, when people believe that environmental conditions cause threats to society or the earth and that the actions they engage in can avert those consequences, people are willing to initiate environmental actions. The belief of the individual that certain actions pose threats are referred to as awareness of consequences (AC) and the belief that the individual's engagement in actions can avert the consequences are being referred to as ascription of responsibility to self (AR). The linear model below (figure 2) explains that personal values (altruistic, egoistic, and traditional) lead to a new ecological paradigm. This new ecological paradigm or worldview refers to *"a view that human actions have substantial adverse effects on a fragile biosphere"* (Stern et al., 1999, p. 85). This influences a person's AC and this in turn influences AR. AR has a positive influence on personal norms for pro-environmental action (Stern et al., 1999).

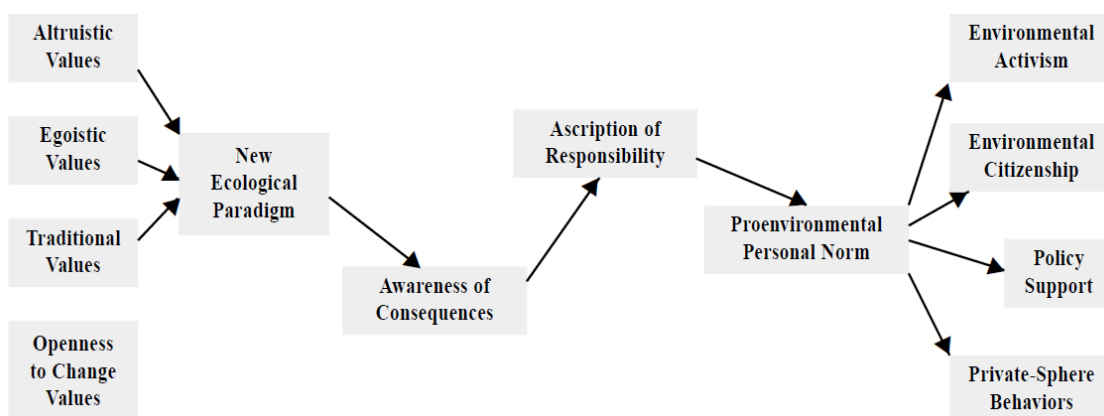


FIGURE 2: SCHEMATIC MODEL OF VARIABLES IN THE VALUE-BELIEF-NORM THEORY (STERN ET AL., 1999)



## **Discussion of the frameworks**

Numerous researchers tried to develop a framework to explain and prove the predictors of pro-environmental behaviour. Throughout the years, however, no all-encompassing answers were found (Kollmuss & Agyeman, 2002), which can partly be attributed to the fact that predicting behaviour varies across behaviours (Ajzen et al., 2011). Up to now, the value-belief-norm theory is not proved to be working, whereas the theory of reasoned action and the theory of planned behaviour are more commonly used (Nye & Hargreaves, 2010). The theory of planned behaviour is also often used in combination with pro-environmental behaviour (Oreg & Katz-Gerro, 2006), for instance by Rioux (2011), who researched battery collecting behaviour and found a positive correlation between the intention to act and the battery collecting behaviour. The TPB is also used by Blok et al. (2015) who tried to explain pro-environmental behaviour in the workplace. Taking these researches into account, the theory of planned behaviour is used as a basis for this thesis.

### ***2.1.3 Factors influencing pro-environmental behaviour***

Since pro-environmental behaviour consists of different categories which are differentiated between individuals, the predictors of behaviour are endless and never the same and cannot be visualised in one single framework (Kollmuss & Agyeman, 2002). However, a few predictors are often used when predicting or explaining behaviour.

#### **Intention**

According to the TPB, intention is the most immediate determinant of behaviour. This predictor indicates whether or not people intend to perform a specific behaviour, how much effort they are willing to put into it, and how hard they are willing to try (Ajzen, 1991). So, the stronger the intention to engage in a specific behaviour is, the more likely this performance will actually occur. According to the TPB, intention is determined by the factors attitude, subjective norm, and perceived behavioural control (Ajzen, 1991).

#### **Actual control**

Even though a person is intending to perform a specific behaviour, it is possible that he or she is not able to do so, because they lack competence or means (Yzer, 2013; Ajzen, 2002). According to the TPB, intention can only cause pro-environmental behaviour when a person is able to decide to perform or not to perform the behaviour (Ajzen, 1991). However, the performance of most behaviour also depends on some non-motivational factors like money, time, skills or cooperation of others (Ajzen, 1991). For instance, when buying an electric or hybrid car is simply too expensive, the intention can be strong, but the lack of financial means can stand in the way of actually doing it. The non-motivational factors mentioned above represent the actual control over a specific behaviour (Yzer, 2013).

## **Attitude**

As previously mentioned, the first determinant of intention is attitude, which is defined as *“the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question”* (Ajzen, 1991, p. 188). A large set of beliefs towards a behaviour, which is shaped over time, cause an overall sense of favourableness toward that specific behaviour (Yzer, 2013). Yzer (2013) explains attitude as a concept of two aspects, an instrumental and an experiential aspect. The first aspect can be explained as how foolish or wise the behaviour is, or whether this behaviour is useful or useless. The second aspect refers to the degree of joy or pleasure the behaviour brings. The basic rule for the factor attitude is, the stronger the attitude towards a specific behaviour, the stronger the intention to engage in this behaviour (Fishbein & Ajzen, 2011).

## **Subjective norm**

Subjective norm is, within the TPB, seen as the second determinant of intention and is defined as *“the perceived social pressure to perform or not to perform the behavior”* (Ajzen, 1991, p. 188). This factor thus reflects the influence of people’s social environment on the performance of a specific behaviour (Yzer, 2013). This factor is called the subjective norm because it reflects a person’s perception of the social pressure of important others, which may not actually reflect the message of these important others about what should be done. The factor subjective norm consists of the injunctive norm and the descriptive norm. The injunctive norm refers to the perceptions of what should or ought to be done concerning a specific behaviour, where the descriptive norm explains the perceptions that others do or do not perform this specific behaviour. These two norms together capture the total social pressure which a person can experience concerning a specific behaviour (Fishbein & Ajzen, 2011). The stronger the perceived social pressure towards a specific behaviour, the stronger the intention to perform this behaviour (Fishbein & Ajzen, 2011).

## **Perceived behavioural control**

The third and last determinant of intention is the perceived behavioural control (PBC). Aside from the actual control a person has to perform a certain behaviour, a more psychological aspect of this factor is the perception of this control, the perceived behavioural control. This view of the PBC of the theory of planned behaviour is comparable to perceived self efficacy, which *“is concerned with judgments of how well one can execute courses of action required to deal with prospective situations”* (Bandura, 1982, p. 122). Several studies about self efficacy have led to the conclusion that *“people’s behaviour is strongly influenced by their confidence in their ability to perform it”* (Ajzen, 1991, p. 184). Therefore, the greater the perceived behavioural control, the stronger the intention to perform the specific behaviour should be (Fishbein & Ajzen, 2011).

## **Environmental concern**

However environmental concern has no direct impact on pro-environmental behaviour, many use this predictor to explain the existence of pro-environmental behaviour (Bamberg, 2003; De Groot & Steg, 2008; Fransson & Gärling, 1999). In the 1970s, environmental concern was viewed as *“the whole range of environmentally related perceptions, emotions, knowledge, attitudes, values and behaviors”* (Bamberg, 2003, p. 21). Through the years, most researchers started to view values, perceptions and knowledge and behaviour related to the environment as variables independent of environmental concern. To date, environmental concern is usually defined as the general attitudes a person holds towards the environment (Bamberg, 2003; Fransson & Gärling, 1999).

## **Values**

Values are not mentioned in the TPB, however they are used in the value-belief-norm theory (Stern et al., 1999). Values play a significant role when explaining behaviour (Stern, 2000; Karp, 1996; Kollmuss & Agyeman, 2002), since people’s values regarding a certain topic shape the intrinsic motivation to perform a specific behaviour (Kollmuss & Agyeman, 2002). According to Fuhrer, Kaiser, Sieler, and Maggi (1995), the values a person holds towards a certain topic are most influenced by the immediate social net, like family and friends. Most studies regarding the relationship between values and pro-environmental behaviour are based on Schwartz’s value system. This value system aims to classify and assess values toward a specific behaviour. This model presents ten types of values which can be placed in four overarching groups: openness to change, conservatism, self-transcendence, and self-enhancement. Openness to change and conservatism are two contradicting factors, where self-transcendence and self-enhancement are also contradicting (De Groot & Steg, 2008). Values related to openness to change and self-transcendence can be strong predictors of pro-environmental behaviour, but values related to conservatism and self-enhancement can be negative predictors of pro-environmental behaviour (Karp, 1996). De Groot and Steg (2008) stress that the distinction between self-transcendence and self-enhancement values is most important when studying pro-environmental behaviour. These components can also be called altruism and egoism respectively (Stern et al., 1999).

### **2.1.4 Knowledge and pro-environmental behaviour**

Several researchers stress the importance of environmental knowledge as a determinant of pro-environmental behaviour (Chan, 1999; Laroche et al., 2001; Kollmuss & Agyeman, 2002; Fishbein & Ajzen, 2011). However, it seems not fully clear how this knowledge influences the behaviour of individuals (Vincente-Molina et al., 2013; Thøgersen & Schrader, 2012). As often stated, to produce the desired outcomes, people have to be well informed. So being misinformed, or not informed at all, can lead to detrimental lifestyles like, eating unhealthy food, not exercising enough, alcohol or drugs

abuse or polluting the environment (Ajzen, Jocy, Sheikh, & Cote, 2011). However, as the knowledge-to-action gap illustrates, accurate information does not always result in wise behaviour (Ajzen et al., 2011). As several researchers illustrate, the relation between knowledge and behaviour is not simple. A classical illustration of this complicated relation is the case of becoming an organ donor. A study on college students shows that the students have average knowledge of the importance and carry strong attitudes towards becoming an organ donator and have the intention to sign up, but only eleven percent of the students actually signed up (Feeley & Servoss, 2005). Kollmuss and Agyeman (2002), therefore, explain that only a small part of pro-environmental behaviour can be linked to the presence of environmental knowledge and state that environmental knowledge does not per se lead to pro-environmental behaviour.

### **Dimensions of knowledge**

In spite of the fact that knowledge is not a sufficient predictor of pro-environmental behaviour, knowledge is still seen as an important and necessary factor for producing behaviour (Ajzen et al., 2011; Braun & Dierkes, 2019; Kaiser & Fuhrer, 2003). Several authors stress the importance of a focus on more than one dimension of knowledge when attempting to explain the unclear relation between knowledge and pro-environmental behaviour (Braun & Dierkes, 2019; Kaiser & Fuhrer, 2003; Jensen, 2002; Frick, Kaiser, & Wilson, 2004; Kollmuss & Agyeman, 2002). Most studies are focussed on solely one or two dimensions of environmental knowledge and lack a focus on the interaction between these dimensions (Braun & Dierkes, 2019; Frick et al., 2004). However, Kaiser and Fuhrer (2003) present a framework which uses multiple dimensions of knowledge to better understand the knowledge-to-action gap. In this framework, they determine four types of environmental knowledge, namely: system knowledge, action-related knowledge, effectiveness knowledge and social knowledge. Obviously, a person, before he or she can act, has to know what can be done. System knowledge relates to knowledge about environmental problems (Frick et al., 2004), or about how environmental systems work (Kaiser & Fuhrer, 2003), for example how CO<sub>2</sub> relates to climate change (Frick et al., 2004). This kind of knowledge reduces uncertainty which allows people to act (Kaiser & Fuhrer, 2003). Action-related knowledge is seen as knowledge of how to achieve a particular goal and possible courses of action (Kaiser & Fuhrer, 2003), or about what can be done about environmental problems. Sticking to the CO<sub>2</sub> problem, if people are aware that CO<sub>2</sub> emissions contribute to climate change, they need knowledge of what they can do to produce less CO<sub>2</sub> (Frick et al., 2004). Effectiveness knowledge refers to the knowledge about the ecological consequences of different behaviours (Kaiser & Fuhrer, 2003) and the benefits that are associated with this particular behaviour. Kaiser and Fuhrer (2003) also address a fourth dimension of knowledge, social knowledge, which can be distinguished in two forms. First, social knowledge can refer to *“the motives and intentions of others”* (Kaiser and Fuhrer, 2003, p.

603). Other people's behaviour is observed, and the knowledge derived from this observation can be used to increase its own declarative or system knowledge. The other form of social knowledge is the *"socially shared or common knowledge"* (Kaiser and Fuhrer, 2003, p. 603), which consists mainly of social norms of people (Kaiser & Fuhrer, 2003). Due to the subjective nature of social knowledge, this concept is hard to measure (Braun & Dierkes, 2019). Therefore, this dimension is not considered in this thesis.

In addition to these four dimensions, Kaiser and Fuhrer (2003) state that pro-environmental behaviour will only be promoted when the different forms of knowledge are promoted jointly and convergently. They explain that before effectiveness knowledge can be required, action-related and system knowledge are needed. In addition, they propose that when a person possesses all dimensions of knowledge but social knowledge, this social dimension can keep that person from performing pro-environmental behaviour. Within environmental education, effectiveness knowledge is absent most often (Kaiser, Roczen, & Bogner, 2008).

## ***2.2 The role of higher education in influencing pro-environmental behaviour***

### ***2.2.1 Education for sustainable development***

Education, as explained previously, can play a pivotal role in empowering students to contribute to a more sustainable world (Summers & Cutting, 2016, Vincente-Molina et al., 2013). To promote and integrate 'education for sustainable development' more into the current education processes, the years 2005-2014 were named as the Decade of Education for Sustainable Development (DESD). This decade was aimed at *"integrating the principles and practices of sustainable development into all aspects of education and learning to encourage changes in knowledge, values and attitudes with the vision of enabling a more sustainable and just society for all"* (UNESCO, 2014, p. 5). This attention to ESD has led to an increase in attention for sustainable development in primary, secondary, higher and informal education (UNESCO, 2014). Vincente-Molina et al. (2013) argue that especially higher education plays a crucial role here, since it educates future leaders, policy makers, researchers and scientists, and thus educates the future decision makers. Society is more likely to adopt a sustainable lifestyle, if these future decisionmakers are able to make sustainable decisions (Vincente-Molina et al., 2013).

The literature on sustainability in education shows a few seemingly similar concepts, namely: 'education for sustainable development' (ESD); 'education for sustainability'; and 'sustainability or sustainable education'. These terms all cover the same concept, to teach students how they can contribute to a more sustainable society. Despite years of research, there is no clear consensus about the definition and entailment of ESD (Summers & Cutting, 2016). However, in its broadest form, it can

be seen as *“an approach to teaching and learning based on the ideals and principles that underlie sustainability”* (Anderson, 2012, p. 193).

There is, however, a difference between education about sustainability and education for sustainability. According to Summers and Cutting (2016), education about sustainability refers to the development of awareness and is more theory-based, while education for sustainability implies that education is used to achieve outcomes in behaviour and practice (Summers & Cutting, 2016). Hopkinson et al. (2008) argue that education for sustainability focusses more on ‘sustainability- or environmental literacy’, which Monroe (2003) explains as the required knowledge, affect, skills and behaviour to contribute to sustainable development. The term literacy originally referred to the ability to read and write, but throughout the years, the term has been extended to include the concept of “well educated, having or showing extensive knowledge, learning or culture” (Roth, 1992, p. 13). In addition, the term was also used for other discourses, such as science literacy or cultural literacy. With the emergence of environmental education during the mid-1960s, the term environmental literacy appeared (Roth, 1992). Monroe (2003) argues that people who are environmentally literate, make choices that are environmentally appropriate. Therefore, when encouraging students to engage in more pro-environmental behaviour, education has to be more pragmatic and needs to be centred more around the valuable outcomes and skills that students can obtain regarding sustainability. This is in line with recent research stating that the increase of knowledge alone does not necessarily lead to a change in behaviour (Kollmuss & Agyeman, 2002).

### ***2.2.2 The ways education can influence pro-environmental behaviour***

Literature shows that there is no singular approach in which education and universities can influence the pro-environmental behaviour of students. Lambrechts et al. (2009), for example, state that higher education can contribute to sustainability through education, research, services and business operations. Corcoran and Wals (2004) state four fundamental goals which an institution can take into consideration when contributing to sustainability. First, sustainable development should be incorporated into the mission and goals of the general education requirements of all disciplines. Second, the institution should reduce its ecological footprint. Third, sustainability committees and audits should be visible. The fourth and final commitment the institution can make towards sustainability is that of engagement with local and global partnerships and collaborations (Corcoran & Wals, 2004).

Hopkinson, Hughes and Layer (2008) distinguish between three ‘curricula’ when explaining the methods for higher education to apply sustainability, namely, formal curriculum, informal curriculum, and campus curriculum. Sustainability within education is mostly applied in the formal curriculum,

known as the course-based, academic programme (Hopkinson et al., 2008). The focus on formal curriculum is logical when implementing sustainability in higher education, since formal education is the fundamental task of a university. However, applying sustainability in the formal curriculum also comes with a few obstacles, such as overcrowded curricula or limited awareness and expertise of staff. Generally, less attention is given to the other forms of implementing sustainability into higher education such as informal curriculum and the role of the campus. Informal curriculum refers to activities outside the formal curriculum which are voluntary and driven by students, like, internships, events, or clubs and societies. Informal curriculum can also experience barriers, such as the lack of resources and funding. The university campus can also be a place where sustainability can be applied practically, which is called campus curriculum. This can be achieved, for instance, by designing sustainable campus buildings and infrastructure. The campus is both seen as a physical place and as a representation of values (Hopkinson et al., 2008).

The three curricula of Hopkinson et al. (2008) are also reflected by other researchers in their ideas about the influence of universities on the PEB of students. According to Vincente-Molina et al. (2013), in order to raise responsible and competent students, higher education needs to impart knowledge, skills and values to contribute to this sustainable world. Traditionally, however, education about sustainability focusses primarily on disseminating factual knowledge in order to inform and influence students (Braun & Dierkes, 2019), thus the formal curriculum. According to Jensen (2002), this knowledge is mainly about the existence and consequences of environmental problems. This scientific form of knowledge is thought to be the starting point of addressing pro-environmental behaviour. However, solely providing this kind of knowledge, and not referring to causes and solutions, may cause a sense of worry and create concern for students. Therefore, it is important that education also addresses the causes of environmental problems and strategies for change (Jensen, 2002).

The important role of using informal curriculum to influence the pro-environmental behaviour of students, is supported by Zsóka et al. (2012). They state that students are, next to the internal factors of knowledge and attitudes, even more strongly influenced by external factors, which could for instance constitute their immediate environment like family, friends, education or institutions. An example of informal education is the Green Office, which is defined as *“a sustainability platform that empowers students and staff to embed sustainability in the curriculum, research, operations, community and governance”* (RootAbility & Leuphana University, 2019, p. 4).

A campus curriculum is another influence that is often mentioned to have effect on the pro-environmental behaviour of students. Zsóka et al. (2012), for instance, states that sufficient infrastructure to perform the behaviour is a key prerequisite for performing pro-environmental

behaviour. They argue that education has the potential to influence the pro-environmental behaviour of students not only, by supporting knowledge and values, but also by *“providing examples and shaping the school as a social setting”* (Zsóka et al. 2012, p. 127). In addition to the campus being a physical place, the campus can also be a place to propagate the values of the university. Blok et al. (2015) agrees that implementing sustainability in education goes beyond curricula of universities, and states that sustainability can also be achieved by influencing *“the performance of role model behaviour of teachers and other staff members”* (Blok et al., 2015, p. 56).

These findings suggest that there needs to be more action-oriented vision into the transferral of knowledge, and that factual knowledge is not the only way to influence students’ pro-environmental behaviour. Moral values and professional skills (Nejati & Nejati, 2012), but also good examples and the social setting at a university can promote pro-environmental behaviour by students.

### **2.3 Conceptual model and hypotheses**

All the earlier mentioned literature is summarized in a conceptual model, in order to provide a clear and systematic overview of the factors that influence the pro-environmental behaviour of students, and how the Radboud University can be influential in shaping this behaviour. The hypotheses used within this thesis will be determined using this conceptual model. The conceptual model, illustrated in figure 3, is divided into two components, since this research is carried out with two separate methods. The blue lines represent the quantitative part of this study and indicate where the adjusted theory of planned behaviour will be tested. This part of the conceptual model is aimed at answering the first two sub-questions of this thesis. The red lines represent the qualitative part of this study. Here, the influence of the Radboud University on the PEB of the students will be explored, which will offer insights for answering the third sub-question of this thesis. A further explanation of the two methods can be found in the next chapter.



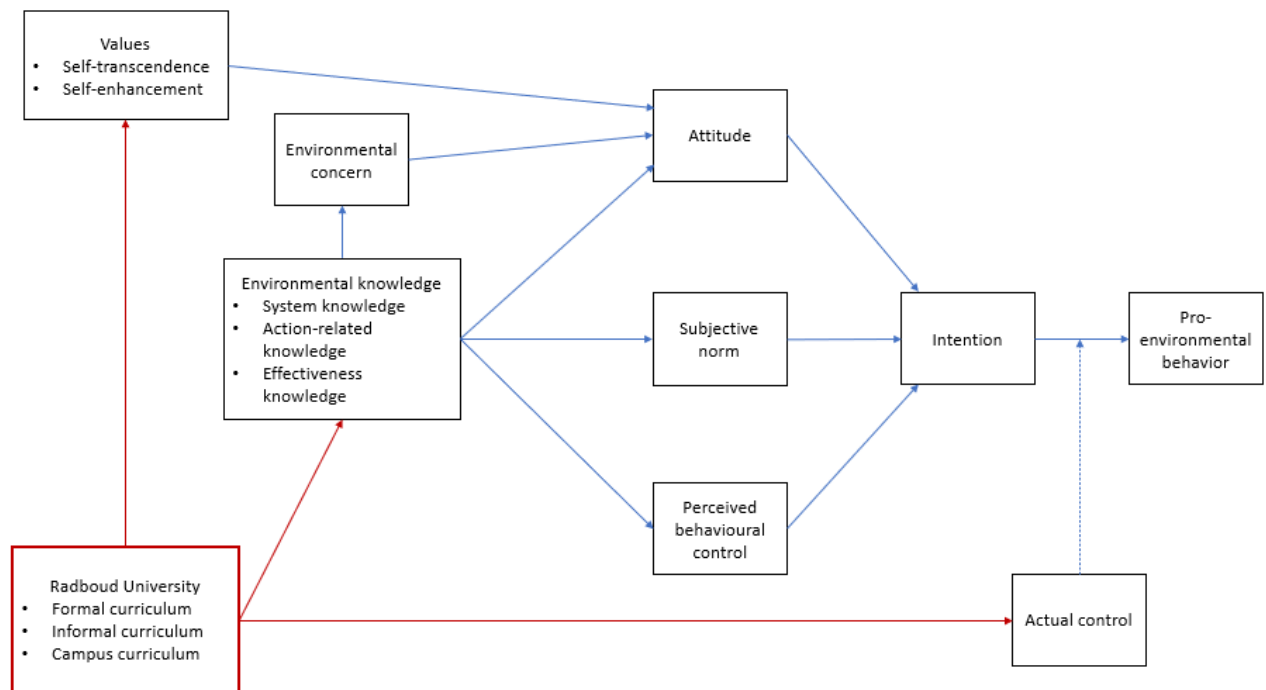


FIGURE 3: CONCEPTUAL MODEL

As mentioned earlier, the theory of planned behaviour of Ajzen (1991) is the base for this thesis. The ‘blue’ part of the conceptual model is based on this theory of planned behaviour of Ajzen (1991), which explains intention as the overall predictor of pro-environmental behaviour. Thus, when students intend to engage in a specific behaviour, this is thought to directly influence their pro-environmental behaviour.

*H1: A high intention to act environmentally responsibly has a positive effect on the pro-environmental behaviour of students.*

The three basic predictors of intention according to the TPB of Ajzen (1991) are the factors attitude, subjective norm and perceived behavioural control. The stronger the attitude of a student towards a specific behaviour or the stronger the subjective norm of a student towards this behaviour the stronger the intention of this student to perform this specific behaviour. In addition, the greater the perceived behavioural control of the student, the stronger the intention of this student to perform this specific behaviour.

*H2a: A strong attitude towards the behaviour in question results in a higher intention to show this behaviour.*

*H2b: A high subjective norm towards the behaviour in question results in a higher intention to show this behaviour.*

*H2c: A high perceived behavioural control towards the behaviour in question results in a higher intention to show this behaviour.*

In this thesis, the factors environmental knowledge, values, environmental concern, and the actual control of students are added to the existing predictors in the theory of planned behaviour. In explanations of the relationship between environmental knowledge and PEB, knowledge is often seen as being mediated through the concepts of attitude and intention. Kaiser and Fuhrer (2003), however, state that more mediators are involved. Therefore, it is useful to explore the relationship between the dimensions of environmental knowledge and the variables that predict intention according to the theory of planned behaviour. To explore these relations, the three dimensions of environmental knowledge: system knowledge, action-related knowledge and effectiveness knowledge are seen as predictors of attitude, subjective norm, and perceived behavioural control. Thus, when the system-, action-related-, or effectiveness knowledge of a student increases, this is thought to increase the attitude, subjective norm or PBC of the student as well.

*H3a: A high system knowledge has a positive effect on attitude.*

*H3b: A high action-related knowledge has a positive effect on attitude.*

*H3c: A high effectiveness knowledge has a positive effect on attitude.*

*H4a: A high system knowledge has a positive effect on subjective norm*

*H4b: A high action-related knowledge has a positive effect on subjective norm.*

*H4c: A high effectiveness knowledge has a positive effect on subjective norm.*

*H5a: A high system knowledge has a positive effect on perceived behavioural control.*

*H5b: A high action-related knowledge has a positive effect on perceived behavioural control.*

*H5c: A high effectiveness knowledge has a positive effect on perceived behavioural control.*

In addition, environmental knowledge reduces the uncertainty of people and informs them, which results in a higher environmental awareness and concern (Blok et al., 2015; Finger, 1994; Braun & Dierkes, 2019; Jensen, 2002). Thus, when students have more information about a topic, their environmental concern is assumed to increase. Therefore, the dimensions of environmental knowledge are also expected to influence environmental concern.

*H6a: A high system knowledge has a positive effect on environmental concern.*

*H6b: A high action-related knowledge has a positive effect on environmental concern.*

*H6c: A high effectiveness knowledge has a positive effect on environmental concern.*

Values and environmental concern are also seen as the predictors of attitudes and behavioural intention (De Groot & Steg, 2008; Bamberg, 2003). Thus, when a student has a high value of self-transcendence, it is thought to increase the attitude towards a specific behaviour. For a high value of

self-enhancement, this effect is thought to be the other way around. When students have a high environmental concern, their attitude towards a specific behaviour is thought to increase.

*H7a: A high value of self-transcendence has a positive effect on the attitude towards the behaviour.*

*H7b: A high value of self-enhancement has a negative effect on the attitude towards the behaviour.*

*H7c: A high environmental concern has a positive effect on the attitude towards the behaviour*

The last obstruction to PEB can occur even when the student already intends to perform this behaviour. This factor pertains to actual control over PEB. When students do not have the necessary infrastructure to perform pro-environmental behaviour, they can intend to act, but be unable to act. This influence of actual control on the pro-environmental behaviour could, due to practicality reasons, not be quantitatively measured. However, the part which the actual control plays in obstructing the pro-environmental behaviour of students, will be rationalized.

The 'red' part of the conceptual model represents the possible influence of the Radboud University on the PEB of students. The Radboud University is thought to influence the students through education, values they propagate as an organisation, and by providing the possibility to act in a pro-environmental way (Corcoran & Wals, 2004; Vincente-Molina et al., 2013). These ways of influence are mediated through three 'curricula', the formal-, informal-, and the campus curricula. Formal curriculum is thought to influence the amount of knowledge of the students. Here, it is important that the university aims to focus on all three dimensions of knowledge. The informal curriculum is thought to positively influence the values of students. The campus curriculum is aimed at using the campus as a physical place to set examples and therefore influencing the values of the students. The campus curriculum is also focussed on providing the students with the required infrastructure to engage in pro-environmental behaviour, which increases the actual control of students. Therefore, the Radboud University is thought to influence the values, environmental knowledge and actual control of students in this conceptual model.

## **2.4 Operationalisation**

In order to get a clear view of the definitions of the different concepts that will be used throughout this thesis, table 1 presents an overview of these definitions. The definitions are chosen on clarity and applicability to the topic of this thesis.

TABLE 1: OPERATIONALISATION OF KEY VARIABLES

Concepts	Categories	Definition	Author
Pro-environmental behaviour		Behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world.	(Kollmuss & Agyeman, 2002, p.240)
Intention		The motivational factors that influence a behaviour.	(Yzer, 2013, p. 124)
Attitude		The degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question.	(Ajzen, 1991, p. 188)
Subjective norm		The perceived social pressure to perform or not to perform the behaviour.	(Ajzen, 1991, p. 188)
Perceived behavioural control		People's perception of the ease or difficulty of performing the behaviour of interest.	(Ajzen, 1991, p. 183)
Actual control		When people have actual control over a specific behavioural performance, they have the necessary resources to perform this behaviour, like time, money, skills and cooperation of others.	(Ajzen, 1991, p. 182; Yzer, 2013, p. 126)
Environmental concern		The general attitude a person holds towards the environment.	(Bamberg, 2003; Fransson & Gärling, 1999)
Values		People's values regarding a certain topic do shape the intrinsic motivation to perform a specific behaviour.	(Kollmuss & Agyeman, 2002)
	Self-transcendence	Values oriented toward the pursuit of self-interest.	(Karp, 1996, p. 113)
	Self-enhancement	Values related to the concern for the welfare of others.	(Karp, 1996, p. 113)
Environmental knowledge		Knowledge of environmental problems, how to act on these problems and what impact this action or behaviour has on the environment.	(Frick et al., 2004; Kaiser & Fuhrer, 2003)
	System knowledge	Knowledge of environmental problems and how ecosystems operate.	(Frick et al., 2004, p. 1599)
	Action-related knowledge	Knowledge of behavioural options and possible courses of action to act on environmental problems.	(Frick et al., 2004, p. 1599)
	Effectiveness knowledge	Knowledge of the relative gain or benefit that is associated with a particular behaviour.	(Frick et al., 2004, p.1599)
Radboud University		The sustainable influence of the Radboud University through education, research, services and business operations.	(Corcoran & Wals, 2004; Lambrechts et al., 2009)

### 3. Methods

After determining what this study is aiming to achieve through the research questions and the conceptual model, the next step is to determine how to realise this. This chapter focuses on how, where and when this research is done in order to answer the research questions. The research philosophy elaborates on which approach is used on the ontological and epistemological subjects and what research approach will be used (Verschuren & Doorewaard, 2010). The research strategy contains answers on the questions whether the research will be focussing on breadth or depth and whether quantitative or qualitative methods are used. The research methods focus on how the research material needed is collected, and in addition, how this material will be analysed (Verschuren & Doorewaard, 2010). The chapter concludes with a discussion about the reliability and validity of the research.

#### 3.1 Research philosophy

The philosophy guiding a research influences the choices of the researcher regarding the data collection, the research methods and the data analysis (Guba & Lincoln, 1994). These choices are partly influenced by the personal beliefs of the researcher, but mostly through the paradigm of the specific discipline (van Thiel, 2014). Guba and Lincoln (1994) define a paradigm as *“the basic belief system or worldview that guides the investigator, not only in choice of method but in ontologically and epistemologically fundamental ways”* (Guba & Lincoln, 1994). The paradigm a researcher uses can be explained on the basis of three subjects, ontology, epistemology and methodology (Guba & Lincoln, 1994). This study uses a post-positivistic perspective on all three of these subjects.

#### Ontology

Ontology refers to *“the nature of reality and its characteristics”* (Creswell, 2013, p. 20) and questions whether reality does truly exist or that a certain phenomena only exists in people’s minds (van Thiel, 2014). Ontology thus questions whether these phenomena exist beyond our influence or that these phenomena are a product of social interaction (Bryman, 2016). The post-positivistic view on ontology takes on the critical realism, where *“reality is assumed to exist, but to be only imperfectly apprehendable”* (Guba & Lincoln, 1994, p. 110). This study aims to better understand the existence of pro-environmental behaviour of students, by finding what does or does not drive these students to engage in a pro-environmental behaviour. For post-positivism, the aim of inquiry is to explain and to ultimately enable the prediction and control of phenomena (Guba & Lincoln, 1994). *“Knowledge consists of non falsified hypotheses that can be regarded as probable facts or laws”* (Guba & Lincoln, 1994, p. 113). The generated knowledge, where each fact serves as a building block, adds to a body of knowledge. When these facts turn into cause effect linkages, they can be used to predict and control

things or situations. Therefore, the post-positivist approach fits best to finding the drivers that can predict pro-environmental behaviour among students.

### **Epistemology**

The subject of epistemology refers to the nature of knowledge (van Thiel, 2014) and in addition relates to what can be known (Guba & Lincoln, 1994). It questions whether everyone has their own reality, or that there is one reality that is the same for everyone (van Thiel, 2014). Another important aspect of epistemology is the view on the relationship between the researcher and the units of study (van Thiel, 2014). Since epistemology is driven by ontological beliefs, the post-positivistic approach does also fit best to this subject. Post-positivism does *“not believe in strict cause and effect, but rather recognize that all cause and effect is a probability that may or may not occur”* (Creswell, 2013, p. 24). In addition, post-positivists do not believe that participants all have one single reality, but rather believe that these participants have multiple perspectives (Creswell, 2013). This corresponds with the prediction of pro-environmental behaviour, where there is no strict model to explain or predict this behaviour, but a composition of several drivers that in most cases can help predict pro-environmental behaviour. In addition, this study assumes that all students have different drivers to perform pro-environmental behaviour, which results in different perspectives on this behaviour. The post-positivistic view on epistemology explains that the researcher and the research object cannot be independent entities, in contrast to the positivistic view. However, while total independency is not possible according to the post-positivistic approach, this approach does idealise this independency. This approach also emphasizes that the findings of the research are probably true, but that these are always subject to falsification (Guba & Lincoln, 1994).

### **Research approach**

When doing research, two methods for performing research can be distinguished, namely inductive and deductive reasoning. Deductive reasoning works from an existing theory and draws hypotheses to test upon this theory. It works from a general theory to more specific insights, sometimes called a top-down approach. Inductive on the other hand, works the other way around, and goes from specific observations and measures towards broader generalizations and theories, which can be called a bottom-up approach (Trochim, 2020). This research takes on a deductive approach, since this research aims to explain and predict pro-environmental behaviour among students with a combination of existing theories. The knowledge is already available and the proposed conceptual model in this study is tested in order to contribute to the existing body of knowledge.

### 3.2 Research strategy

The first step of determining how to answer the research question, is determining the research strategy. This research strategy can be defined as *“the coherent body of decisions concerning the way in which the researcher is going to carry out the research”* (Verschuren & Doorewaard, 2010, p. 155). When determining the research strategy, first, the distinction between breadth and depth has to be made. Breadth within a research study leads to a large-scale approach which can result in the generalisation of the findings. Depth, on the other hand, is a small-scale approach that strives for complexity and elaboration which results in less generalisable but more sound results (Verschuren & Doorewaard, 2010). Related to the breadth and depth of the research, a distinction can be made between a qualitative and quantitative approach. When striving for breadth within the research, it is logical to choose for a quantitative approach since this approach is more useful when assessing a large quantity of data. When striving for more depth, the qualitative approach fits better (Verschuren & Doorewaard, 2010).

The main research question of this study was stated as: *“To what extent does the pro-environmental behaviour, regarding reducing meat consumption and separating waste, of students of the Radboud University correspond with sustainability-oriented action performed by the Radboud University?”*. To answer this research question, both broad- as in-depth research techniques are necessary, which is also called triangulation or mixed methods (Creswell, 2015; Verschuren & Doorewaard, 2010). The first two sub-questions are aimed at identifying the factors that influence this pro-environmental behaviour, as well as determining the pro-environmental behaviour of students at the Radboud University. These two sub-questions will be focussed on in breadth, because a better picture of the relations between the variables can be established and the answers on these questions can be better generalized. The third sub-question is, however, aimed at achieving insight into the ways the Radboud University tries to stimulate the pro-environmental behaviour of their students. Therefore, this sub-question calls for a more in-depth research method into the sustainability approach by the Radboud University in order to get a sound picture of their activities.

According to Creswell (2015), mixed methods are valuable, because the combination of the two research methods results in more than what was retrieved when these two methods were conducted individually. The additional value created is the fact that the two methods strengthen each other resulting in the ability to better understand a specific problem (Creswell, 2015). In addition, mixed methods are useful because you can check whether the qualitative research is indicating the same answers as the quantitative research, or the other way around. Using qualitative research after doing quantitative research is often used to help explain the findings in a more detailed way (Creswell, 2015). Thus, by making use of mixed methods, this study benefits from the advantages of both studies,

collecting a broad spectrum of information on the behaviour of students, and with depth interviews, trying to better understand this collected information.

### **3.2.1 Research object**

This thesis uses the Radboud University as a research object to collect data. This choice is mainly for practical reasons since it is not possible to assess the whole body of Dutch university students. Therefore, this research is done within the limits of one university. Since the internship of this master thesis takes place at the Occupational Health and Safety and Environmental service (Arbo- en Milieudienst), which assists the Radboudumc and the Radboud University and offers them advice and guidance in the field of vitality, safety and sustainability (Radboud University, n.d.-a), using the Radboud University as case study was a logical decision.

The Radboud University in Nijmegen is a broad university with over twenty-two thousand students, on seven different faculties (Radboud Universiteit, n.d.-b). In the recent years, sustainability has received more attention within the university and to date, sustainability has gained a prominent spot in education, research and business (Radboud University, 2019a). In addition to the bachelor Geography, Planning and Environment, the master Environment and Society studies, and the minor Sustainability Challenges, which are directly aimed at sustainability, sustainability is reflected in about seventy courses at bachelor's and master's level (Radboud Universiteit, 2019).

### **3.2.2 Survey**

Four main research strategies can be used to answer the research question: the experiment, survey, case study and desk research. Within this research object, two research strategies can be determined, since mixed methods are used. The survey will be the best strategy to answer the broad and quantitative sub-questions, since it is very suitable for deductive research (Korzilius, 2008). The survey is aimed at giving an overview of a particular theme and it is able to measure a large number of units and a large number of variables (Korzilius, 2008; van Thiel, 2014). These research units are randomly sampled, meaning that all research units have the same chance of becoming a part of the survey. This random sample selection is needed to guarantee a representative picture of the whole population in order to generalise the findings to the whole population (Verschuren & Doorewaard, 2010). A cross-sectional survey is a type of research where the research material is *“gathered at a certain moment in time from one and the same group”* (Verschuren & Doorewaard, 2010, p. 163). The large number of research units enables the researcher to obtain a wide overview and generally valid statements, but it also enables the researcher to determine all sorts of statistical relationships, which is very useful for this thesis (Verschuren & Doorewaard, 2010).



### **3.2.3 Case study**

In addition to the survey, the case study will be the second research strategy of this thesis. Within the Radboud University as research object, the case study will be focussed on answering the third, qualitative, sub-question, which is focusses on getting a detailed view of the sustainably oriented activities of the Radboud University. In this study, it was deliberately chosen to study just one case instead of more cases. Within the limits of time and resources, it was chosen to look more closely at the details of one case than using the resources to study more cases with less depth. A feature that characterises the case study, is that *“research is conducted in a real-life setting”* (van Thiel, 2014, p. 86).

## **3.3 Research methods**

After determining the research strategy, it is necessary to determine the research methods. These research methods refer to the method to gather and the needed data and analyse this data. As explained before, this thesis will use several methods to collect data in order to get a broad, and at the same time detailed, understanding of the behaviour of students and its predictors. This thesis consists of three different methods to collect the necessary data, literature study, a questionnaire and short interviews.

### **3.3.1 Literature study**

In the preparatory phase of this thesis a literature study was conducted. This proved useful in obtaining the information and insights necessary for forming the scientific background to start this thesis. The first sub-question of this thesis is also answered based on a literature study and was used to get an overview of the factors influencing pro-environmental behaviour. In addition, the literature study was also helpful to answer the third sub-question, since the available information in policy documents and the Radboud website is used to expand the information on the activities of the Radboud University regarding the pro-environmental behaviour of students.

### **3.3.2 Questionnaire**

When using a survey as research strategy, the questionnaire is the most used research method. The questionnaire is best known as written questionnaire, where the respondents must fill in a fixed list of questions. In general, solely closed-ended questions are used for this method, but open-ended questions are also possible. Using open-ended questions is less efficient but can also give a better view of the respondents' opinions or knowledge (van Thiel, 2014). To answer the research question of this thesis, students are asked to fill in this questionnaire with questions about their behaviour and its predictors, which were explained in chapter two. Since Ajzen (1991, p.188) states that *“the relative importance of attitude, subjective norm, and perceived behavioural control in the prediction of intention is expected to vary across behaviours and situations”*, it is important to look at different kinds

of behaviours. The questionnaire is therefore aimed at two specific behaviours, which was already mentioned in the introduction, namely reducing meat consumption and separating waste. These specific behaviours are chosen since these behaviours are applicable to students, and because the Radboud University aims to inform her students about these topics.

All variables that will be measured with the questionnaire will be operationalized and numerical values are connected to these variables. These scores are all collected in a code book, where all the used variables and their values are noted down (van Thiel, 2014). The questionnaire will be made in the online program Qualtrics, facilitated by the Radboud University. Before spreading the questionnaire, it was first tested in a pilot, to distinguish any mistakes in the course of the questionnaire and the line of questioning (van Thiel, 2014). After applying the feedback which resulted from the feedback, the questionnaire has been spread online to the students of the Radboud University, through social media, the digital communication platform Brightspace and personal contacts.

The survey was spread online from June 19<sup>th</sup> until July 10<sup>th</sup>, 2020. The survey got 112 respondents, but due to technical complications, three of them had to be deleted and this resulted in 109 respondents. The distribution of men and women who took the survey is respectively 47.7% and 52.3% and the average age is 23 years. The distribution of the faculties was not even, since Nijmegen School of Management faculty is over-represented by 62.4%. The respondents are on average studying for more than four years. The relative high age of the respondents and the fact that more than fifty percent of the respondents is from the Nijmegen School of Management faculty is probably due to the influence of my own personal contacts. Due to Covid-19, it was not possible to physically go to the university and approach students randomly, as was the plan. Unfortunately, the options of getting in touch with students were limited to social media and my own personal contacts. Therefore, the body of respondents is less representable than expected.

### ***3.3.3 Interviews for depth***

In addition to the literature study and the questionnaire, three in-depth interviews were held to obtain more insights and information about the actions taken towards sustainability by the Radboud University. These interviews were held with representatives from positions related to sustainability within the Radboud University, namely the coordinator of the Radboud Centre for Sustainability Challenges, the coordinator of the Green Office of the Radboud University and the program director sustainability. In order to get information specifically about the meat consumption reduction and waste separation at the Radboud University, two additional interviews were held with the team leader of the Cultuur Café and the contract manager/supervisor of cleaning, waste and pest control. The

interviews were all audio recorded, transcribed and coded with the coding program Atlas.TI, with the exception of the last interview, which was conducted over e-mail.

### **3.4 Measuring theoretical concepts**

In order to answer the research question, the theoretical concepts found in chapter two, have to be translated into entities that can be measured. Since, pro-environmental behaviour is a broad concept, not all parts of this behaviour can be measured independently. As Ajzen et al. (2011) states, general dispositions or general knowledge are poor predictors of specific actions. For instance, measuring exercise, which is a general behaviour, differs from measuring the specific behaviour 'running'. A person can give completely different answers to questions about running than to questions about exercise, because he or she associates these activities with different beliefs (Yzer, 2013). To overcome this problem, the compatibility principle can be used. This principle states that the *"prediction of behaviour improves when behaviour is measured at the same level of specificity as beliefs, attitude, and intention"* (Yzer, 2013, p.123). Therefore, it is important that all variables are measured at the same specific level.

Each variable will be assigned values or scores in order to exactly measure this variable (van Thiel, 2014). Most variables will be operationalised and measured following Ajzen et al. (2011), since they explained their measuring tactics very detailed and they proved these tactics to be reliable. In their report, Ajzen et al. (2011) measure energy-saving behaviour. Therefore, this thesis adapts the questions to other topics, on the basis of the questions of Ajzen et al. (2011). The complete set of questions can be viewed in appendix I.

#### **Demographic factors**

To say something about the group of respondents and to determine whether this is a representative group of Radboud students, it is useful to ask for their gender and age. In addition, gender and years of education mostly influence pro-environmental behaviour (Meyer, 2016). For instance, women seem to be more emotionally engaged and more concerned and more willing to change (Kollmuss & Agyeman, 2002; Fishbein & Ajzen, 2011). Looking at the years of education, the most basic rule is, the longer the education, the more knowledge (Kollmuss & Agyeman, 2002). Therefore, the students are asked for their gender and years of education, but to get a whole view of their background, their age and the faculty they follow education are also attached.

#### **Pro-environmental behaviour**

To get a good idea of the pro-environmental behaviour of students, the participants are asked to answer several questions regarding to how often they engage in specific behaviours related to the

separating waste and reducing meat consumption. For example, “How many days a week do you eat meat?” and “To what extent do you separate the following types of waste?”. These questions can be respectively answered by the number of days and on a five-point scale from never to always.

### **Intention**

The intention to engage in a specific behaviour is mostly measured by asking “How likely is it that you...” and “I intend to...” with the respectively scales I definitely will not to I definitely will and I completely disagree to I completely agree (Yzer, 2013). Ajzen et al. (2011) also uses this way of measuring intention. Therefore, the survey contains five questions comparable to the questions of Yzer (2013) and Ajzen et al (2011). Examples of statements are “I am likely to eat less meat this year” and “I plan to separate my waste better this year”, which can be answered on a five-point Likert scale of strongly agree to strongly disagree.

### **Attitude**

Fishbein and Ajzen see attitude as the possible performance of behaviour which can be evaluated in terms of “favour or disfavour, good or bad, like or dislike” (Fishbein & Ajzen, 2011, p. 78). Following these statements and taking the questions of Rioux (2011) into account, who studied the battery collecting behaviour of secondary school pupils, four questions measuring attitude were formulated. Two examples of questions are “I’m in favour of eating less meat” and “Separating waste is important to me” which can be answered on a 5-point scale of completely agree to completely disagree. All variables are measured on a 5-point Likert scale.

### **Subjective norm**

In the theory of reasoned action of Fishbein and Ajzen, subjective norm is defined as *“the extent to which I believe that other people think that I should or should not engage in a particular behaviour”* (Yzer, 2013, p. 127-128). To capture this variable, five questions regarding the opinion of others concerning a specific behaviour are formulated according to the questions of Ajzen et al. (2011). For instance: “People whose opinions I care about approve of me separating my waste better this year” with a 5-point strongly disagree to strongly agree scales. All variables are measured on a 5-point Likert scale.

### **Perceived behavioural control**

Ajzen defined perceived behavioural control as *“people’s perception of the ease or difficulty of performing the behavior of interest.”* (Ajzen, 1991, p. 183). To measure this variable, five questions are formulated based on the questions of Ajzen et al. (2011). An example of a question measuring PBC is:

“Whether I separate my waste better this year is entirely up to me” with a five-point scale of strongly disagree to strongly agree. All variables are measured on a 5-point Likert scale.

### **Dimensions of knowledge**

To date, a specific set of questions which assess the three dimensions of environmental knowledge does not exist (Braun & Dierkes, 2019). This can partly be explained by the fact that predicting specific behaviour is more precise than predicting general behaviour (Yzer, 2013; Ajzen et al., 2011). In addition, Yzer (2013) states that when behaviour is measured at the same level of its predictors, the prediction of behaviour improves. That being said, standardized questions of every specific behaviour and environmental knowledge regarding this behaviour have to be developed to predict this specific behaviour. Since these specific questions are not available, this study developed its own measure of the three different dimensions of knowledge. For each specific behaviour, nine questions were set up, three for each dimension. These knowledge questions have been developed on the basis of the factual and practical information of ‘Milieu centraal’ which is an independent platform with sustainable tips and advices<sup>1</sup>. The questions about system knowledge refer to the structures and functions of the specific behaviour in question and question why this behaviour is environmentally friendly or not. The questions related to action-related knowledge are about the things people can undertake to perform or not perform this behaviour. The questions to measure effectiveness knowledge illustrate the impact of the specific behaviour. These dimensions together represent the degree of environmental knowledge of a person.

### **Environmental concern**

Nine items for the general environmental concern are added to the questionnaire. These questions are fully based upon the questions asked by Ajzen et al. (2011), despite the fact that environmental concern is not measured concerning at the same level of the specific behaviour. The responses of the participants are provided on a 5-point scale labelled as strongly disagree and strongly agree or never and always. Examples of questions are: “When humans interfere with nature it often produces disastrous consequences” and “There is no scientific proof for global warming”.

### **Actual control**

Since there is no existing measure for measuring the actual control of people over a certain behaviour, a measure is created in this study. If people indicate that they do not perform certain behaviour, they are asked about why they do not perform this behaviour. To see whether the actual control of people leads to not performing this behaviour, these people are asked about whether time, money, skills, and

---

<sup>1</sup> <https://www.milieucentraal.nl/>

the cooperation of others are influencing their lack of performing the behaviour. Two examples are, “I don’t have time to separate my waste” or “I don’t know how best to prepare a vegetarian dish”.

### **Values**

De Groot and Steg (2008) use four values to measure each self-enhancement and self-transcendence, based on the findings of Stern et al. (1998). The self-enhancement values consist of social power, wealth, authority and influential. The self-transcendent values are equality, a world at peace, social justice and helpful (De Groot & Steg, 2008). The respondents are asked to what extent these values are important for them and can be rated on a five-point Likert scale from very important to very unimportant.

### **Influencing factors**

In order to discover the factors that influence the behaviour of the students, and to get an idea of whether the Radboud University has an impact on the behaviour of students, the students are asked to decide for each factor whether they do have a positive or negative influence on their specific behaviour of reducing meat consumption or separating waste.

## **3.5 Data analysis**

For the analysis of the data, the program SPSS will be used. In order to prepare the dataset to be analysed, the retrieved data from the questionnaire first will be recoded, categorized and processed (van Thiel, 2014).

### **3.5.1 Reliability of the measuring instrument**

Since there are a few variables in the questionnaire that are determined by asking several questions, for instance attitude or intention, an important part of the data preparation is to merge these questions into one average score on the attitude scale. In order to merge these questions, it is important to first measure the reliability these questions, therefore determining whether the scale is measuring what you wanted to measure (Korzilius, 2008). This scale reliability is measured with the Cronbach’s Alpha ( $\alpha$ ). A scale is considered to be reliable enough when the Cronbach’s Alpha is higher than 0.70. Sometimes, a scale gets more reliable when one or more variables are deleted (Korzilius, 2008). As visualized in table 2, for some variables, the Cronbach’s Alpha turned out to be lower than 0.70 and for these scales, some variables were deleted to get a better and sufficient reliability. This is displayed in the column ‘adjusted scale’. Since all (adjusted) scales are reliable according the Cronbach’s Alpha, the scales are merged into the basic variables which are displayed in the conceptual model.

TABLE 2: RELIABILITY ANALYSIS WITH CRONBACH'S ALPHA ( $\alpha$ )

	Scale	Cronbach's Alpha ( $\alpha$ )	Cronbach's Alpha ( $\alpha$ ) with adjusted scale
Reducing meat consumption	Intention	0.662	0.964
	Attitude	0.893	-
	Subjective norm	0.807	-
	Perceived behavioural control	0.731	-
Separating waste	Intention	0.976	-
	Attitude	0.88	-
	Subjective norm	0.742	-
	Perceived behavioural control	0.729	0.784
	Environmental concern	0.812	-
	Values - self enhancement	0.59	0.747
	Values - self transcendence	0.806	-

### 3.5.2 Multiple regression analysis

In order to explore the relative influence of the variables on the pro-environmental behaviour, multiple regression is the best fitting analysis. As the name implies, can multiple regression assess the influence of several independent variables on one single dependent variable, which is needed to answer the research question of this thesis (Foster, Barkus, & Yavorsky, 2006).

In order to generalise the findings of the analysis, several assumptions must be met for a multiple regression analysis (Field, 2018):

- The errors in the model are independent of each other;
- The relation between the independent and the dependent variable should be linear;
- Homogeneity of variance;
- The errors have to be normally distributed (Field, 2018).

It can be stated that the first assumption, where the errors should be independent of each other, is already met. The respondents filled in their questionnaire independently and people did not confer while answering the questions, the assumption of independence is met. Homogeneity of variance, sometimes called homoscedasticity, means that the variance of the dependent variable should be stable at all levels of the independent variable (Field, 2018). Linearity and homoscedasticity can both be assured when looking at the scatterplot. When there is no systemic relationship between the dots in the scatterplot, both assumptions can be hold true. Looking at the scatterplots in Appendix II, there seems to be no relationship of any kind, so the assumptions linearity and homoscedasticity are both met. The assumption of normality can be checked when looking at the P-P plot and the histogram. The

points on the P-P plot need to be placed close to the diagonal line and the bars in the histogram should be distributed evenly (Field, 2018). Appendix II shows that all the assumptions have been met, except for the normality of all the PEB's of separating waste. This can be caused by the mainly unanimous answers, but since the assumptions for these particular regression analyses have not been met, this analysis cannot be conducted.

### ***3.6 Validity and reliability of the research***

The reliability of a research is, according to van Thiel (2014) the function of the accuracy and the consistency. The accuracy of a study is focused mainly on the measurement instruments are used. The consistency of a study refers to the repeatability of this study. The study must lead to similar results, when conducted under the same circumstances. The repeatability of the research leads to a high reliability, because when the research shows similar results when conducted several times, this makes it more reliable that the founded results were right. In addition, the reliability of a study refers to the soundness of the measurement instruments. A high level of reliability means that the results of the study are not likely to be coincidental (van Thiel, 2014). This thesis largely uses existing, more often used measures for the variables examined. Despite the fact that the questions used measuring the variables are adapted to specific behaviours, the general measuring tactics are kept up. This does not apply for measuring the environmental knowledge. While the knowledge questions are designed following a proven tactic, the informative and factual questions are not empirically tested for this specific behaviour. This can possibly limit the accuracy of the measuring instrument. The consistency of the measuring instrument is high, since largely measurement tactics are used which are repeatedly proved to be working (Ajzen et al., 2011; De Groot & Steg, 2008).

The validity of a study is separated into internal validity and external validity. The internal validity questions whether the research actually measured what it intended to measure. The external validity focusses on the generalizability of the study, so whether the results of the study are applicable to other persons or moments in time who are comparable to the units of study. When the study is generalizable, it is possible to say that certain outcomes are applicable to the whole group (van Thiel, 2014). The internal validity can be compromised when variables are not properly operationalized or formulated. Doing a pilot with the developed questionnaire can partly overcome this problem (van Thiel, 2014). Secondly, the internal validity can be compromised since the respondents report their own behaviour. Observing the behaviour of respondents is not possible, due to constraints in time and resources. Self-reports are often used as measures of pro-environmental behaviour, since some behaviours are not observable and with these self-reports they can be investigated (Kormos & Gifford, 2014). However, a disadvantage of self-reporting is that it reflects the perceptions of the respondent's behaviour and behavioural intentions, rather than the objective behaviour (Kormos & Gifford, 2014). In an attempt



to partially overcome this problem, the questionnaire empathically asks the respondents to answer the questions honestly and fair.

The external validity of this thesis is predominantly high, since a benefit of using surveys is the generalizability of the study, which is due to the relatively large number of respondents. The external validity can, however, have problems when there is a non-response. Non response refers to the fact that *“not all students who have been asked to participate in the survey will actually do so”* (van Thiel, 2014, p. 83), which will lead to a diminished representativeness, this will lead to a less sufficient representation of the population. In addition, people are inclined to give politically correct or socially desirable answers instead of the real ones. This problem will partly be overcome through the anonymously and online questionnaires, but it will probably still occur.

## 4. Results

This chapter will elaborate on the results of the specifics and the analysis of the gathered data, and aims to answer the second, third and fourth sub-question, proposed in the introduction. First, the general outcomes of the questionnaire will be discussed and a first insight in the relations between the variables will be provided by the correlations. In order to answer the second sub-question, the proposed hypotheses will be tested by carrying out a multiple regression analysis. The results will be discussed separately for the pro-environmental behaviour of reducing meat consumption and the pro-environmental behaviour of separating waste, whereafter the two specific behaviours are compared. The second part of this chapter aims to answer the third sub-question and focusses on analysing and summarising the results of the conducted interviews to get a better view of the sustainably oriented activities of the Radboud University. The last part of this chapter is focused on answering the fourth sub-question, where the results of the questionnaire and interviews are compared.

### 4.1 General outcomes of the questionnaire

In order to get a clear view of the results of the questionnaire, a first step is to look at the descriptive statistics, where the general outcomes of the questionnaire will be explained. This section of the analysis will focus on the second sub-question: *What is the degree of pro-environmental behaviour of students on the Radboud University regarding reducing meat consumption and separating waste?* The descriptive statistics will be explained separately for the two specific pro-environmental behaviours of the students.

#### 4.1.1 Reducing meat consumption

The pro-environmental behaviour of reducing meat consumption varies greatly among the students of the Radboud University. These students were asked how many days a week they eat meat, and as figure 4 displays, the answers are evenly distributed. On average the Radboud students eat meat four days a week, on average, and 16.5% of the students eat completely vegetarian. The amount of days a student eats meat is concerted to the pro-environmental behaviour. When a student eats meat seven days a week, their pro-environmental behaviour regarding this topic is low, and vice versa. The pro-environmental behaviour regarding reducing meat consumption is 3.19 on average, with a standard deviation of 2.36. As visualised in figure 5, female students of the Radboud University have a higher pro-environmental behaviour than males, which is on average respectively 4.11 and 2.19. The PEB seems to rise when students study more years, but this rise stops at five years of studying (figure 6).

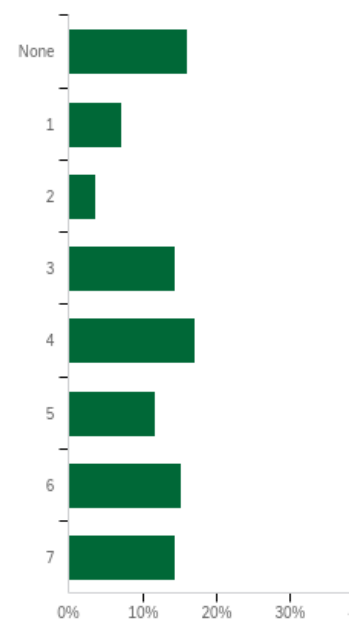


FIGURE 4: DISTRIBUTION OF THE ANSWERS ON THE QUESTION "HOW MANY DAYS A WEEK DO YOU EAT MEAT?"

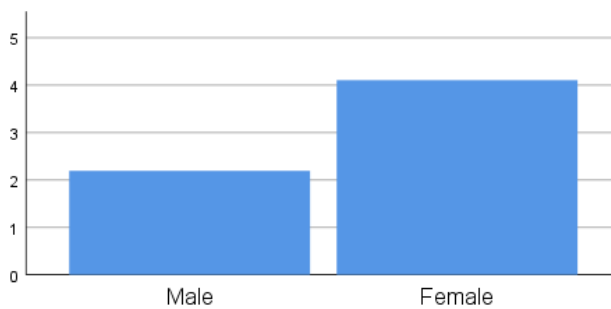


FIGURE 5: THE DISTRIBUTION OF THE PRO-ENVIRONMENTAL BEHAVIOUR OF STUDENTS REGARDING REDUCING MEAT CONSUMPTION, DIVIDED BY GENDER

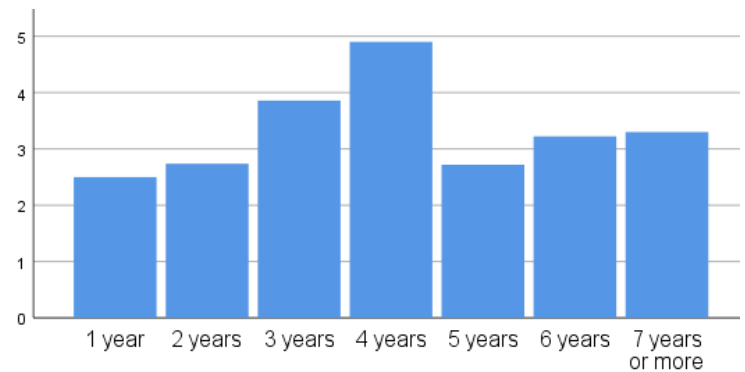


FIGURE 6: THE DISTRIBUTION OF THE PRO-ENVIRONMENTAL BEHAVIOUR OF STUDENTS REGARDING REDUCING MEAT CONSUMPTION, DIVIDED BY THE YEARS OF EDUCATION

### Reasons for not showing PEB

The respondents were asked why they do not eat vegetarian meals more often. Figure 7 shows the distribution of these reasons, where the most chosen reason is the fact that they do like to eat meat. Another often indicated reason is that the respondents eat together with people (family, friends, or housemates) who like to eat meat. Additionally, the respondents state that they are satisfied with their current distribution of meat and vegetarian meals. Other indicators are that the price or quality of meat substitutes are not adequate enough to replace meat, or that the students do not know how to prepare a vegetarian dish.

### Factors influencing the PEB

The students of the Radboud University were asked which factors they perceived to have influence on their behaviour and whether this influence was positive or negative. The respondents indicate that they are mostly influenced to eat more meat by their family (39.5%), friends (19.8%), relationship (16%), and side job (12.3%). The students also indicated the factors which influence them to eat less meat. Here, the field of education and lectures is indicated most often (18.6%), followed by friends (17.4%), fellow students (14.6%) and the lay-out or facilities on the Radboud campus (11.1%).

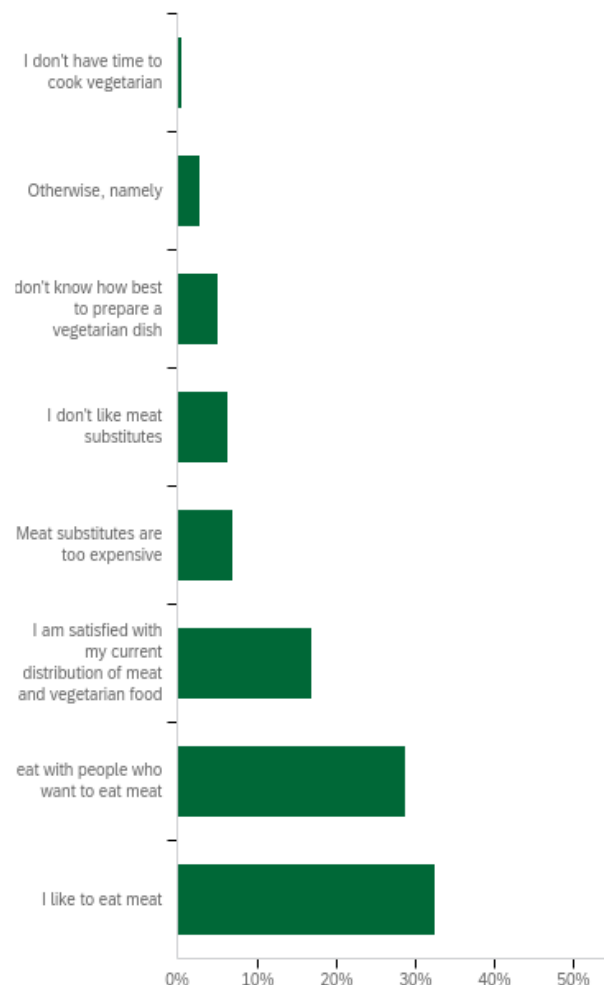


FIGURE 7: REASONS INDICATED BY STUDENTS, OF WHY THEY DO NOT EAT MORE VEGETARIAN

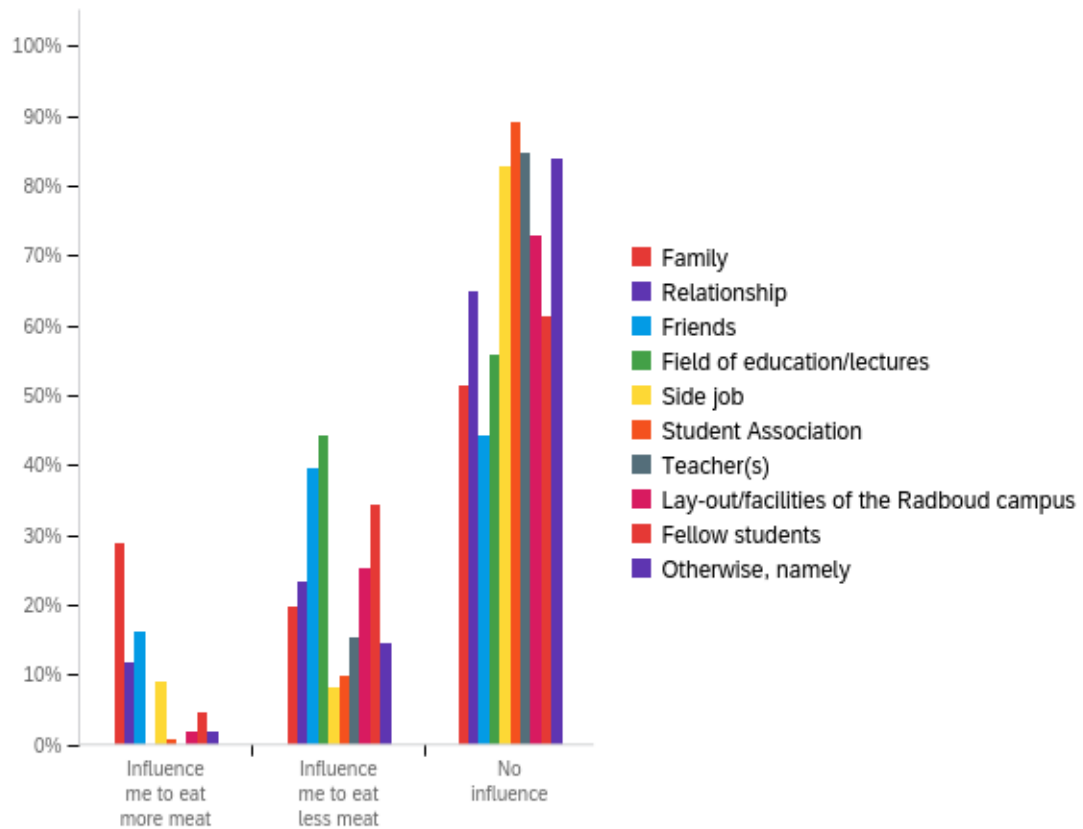


FIGURE 8: DISTRIBUTION OF FACTORS INFLUENCING STUDENTS TO EAT MORE OR LESS MEAT

The Radboud students indicated whether the factors intention, attitude, subjective norm and perceived behavioural control, had effect on their reduction of meat consumption on a scale from 1 to 5. On average, the students scored a 3.58 on intention, 3.90 on attitude, 3.09 on subjective norm and 3.92 on perceived behavioural control. The Radboud students scored 6.05 out of a total 9 points on the environmental knowledge on the environmental impact that reducing one's meat consumption has. Action-related knowledge is the highest among the students, with an average score of 2.57 out of 3, followed by system knowledge with a score of 2.14 out of 3. Effectiveness knowledge is the lowest dimension of knowledge among Radboud students, with 1.34 out of 3.

TABLE 3: MEAN VALUES, STANDARD DEVIATIONS FOR THE FACTORS INFLUENCING PRO-ENVIRONMENTAL BEHAVIOUR

	Variable	Mean	Std. Dev.
Reducing meat consumption	Pro-environmental behaviour	3.19	2.36
	Intention	3.58	1.20
	Attitude	3.90	0.97
	Subjective norm	3.09	0.85
	Perceived behavioural control	3.92	0.71
	Environmental knowledge	6.05	1.35
	System knowledge	2.14	0.81
	Action-related knowledge	2.57	0.40
	Effectiveness knowledge	1.34	0.84

#### 4.1.2 Separating waste

The waste separating behaviour of Radboud University students is further detailed and divided by linking them to five separate sorts of wastestreams, namely glass, paper, organic waste, paper and batteries. The students indicate that they separate all of the wastestreams regularly or always, except for the organic waste, as visualized in figure 9. Glass is the wastestream that is most often separated by students, followed by paper, plastic, and batteries respectively. Organic waste is separated least frequently and students even answer this question with never and sometimes. When all the waste streams are brought together, the pro-environmental behaviour of students is 4.37 out of 5. Similar to the pro-environmental behaviour regarding reducing meat consumption, the pro-environmental behaviour regarding separating waste is produced by the answers of students to the question of how often they separate waste. When students answer this question with always, their pro-environmental behaviour is high, and the other way around. In contrast to the PEB of reducing meat consumption, the PEB of separating waste does not differ much between males and females (figure 10). And as figure 11 shows, the years of education of a student does also not influence the PEB much.

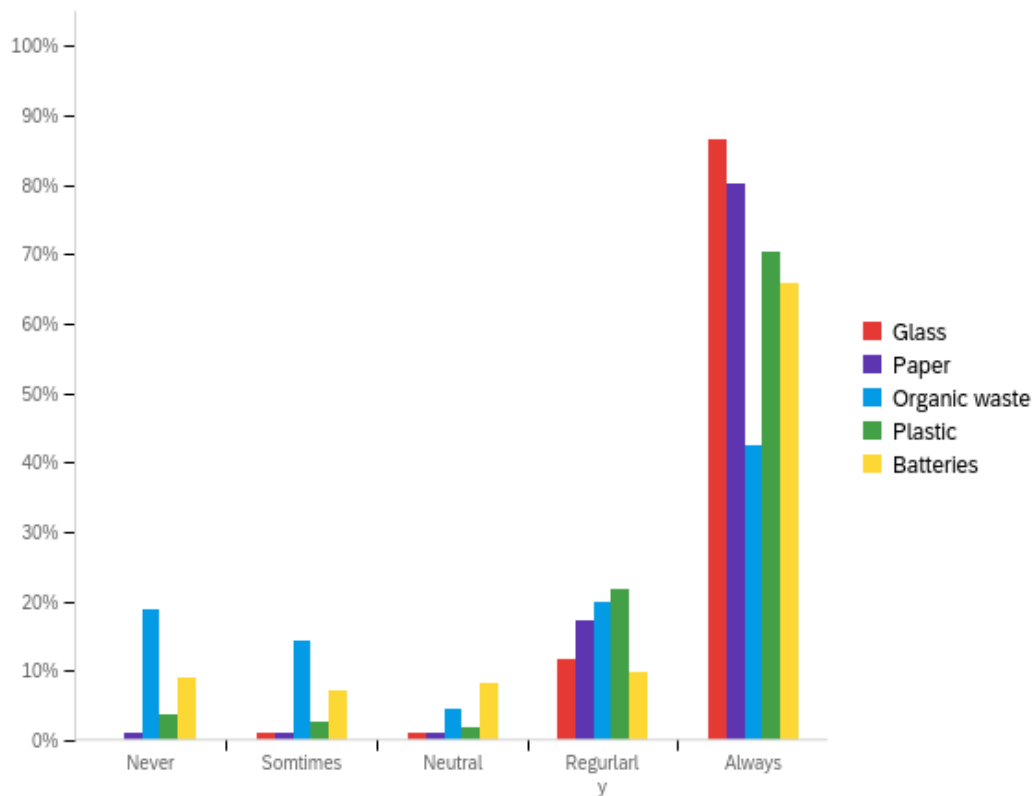


FIGURE 9: DISTRIBUTION OF ANSWERS ON THE QUESTION "TO WHAT EXTENT DO YOU SEPARATE THE FOLLOWING TYPES OF WASTE?"

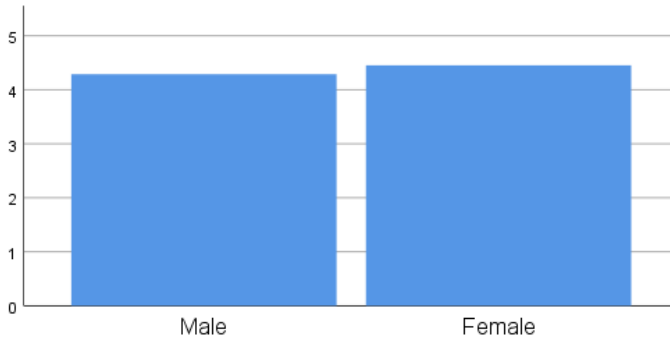


FIGURE 10: THE DISTRIBUTION OF THE PRO-ENVIRONMENTAL BEHAVIOUR OF STUDENTS REGARDING SEPARATING WASTE, DIVIDED BY GENDER

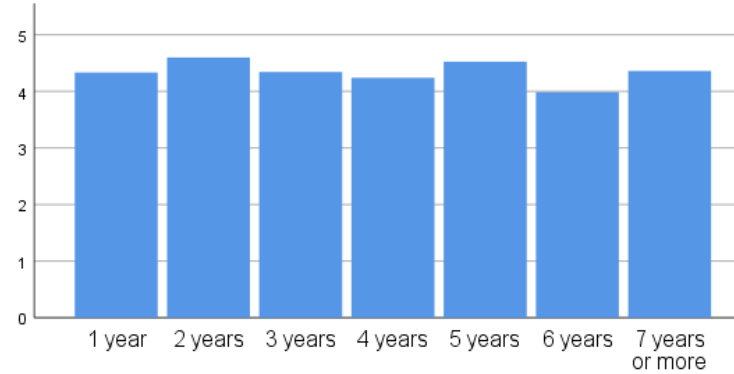


FIGURE 11: THE DISTRIBUTION OF THE PRO-ENVIRONMENTAL BEHAVIOUR OF STUDENTS REGARDING SEPARATING WASTE, DIVIDED BY THE YEARS OF EDUCATION

### Reasons for not showing PEB

In order to better understand the students' low PEB, the students were asked for the reason they behaved the way they did. Students indicated that the main reason for not separating their waste is that they do not have the correct information to properly separate their waste. Another prominent reason is that housemates do not separate their waste. The factors money and time do not seem to be a big reason for students to not separate their waste. In the 'otherwise, namely' section of the question, students indicated that the facilities are inadequate to always separate waste. These inadequate facilities are especially the case for organic waste, which may be an explanation for the low PEB on organic waste separation.

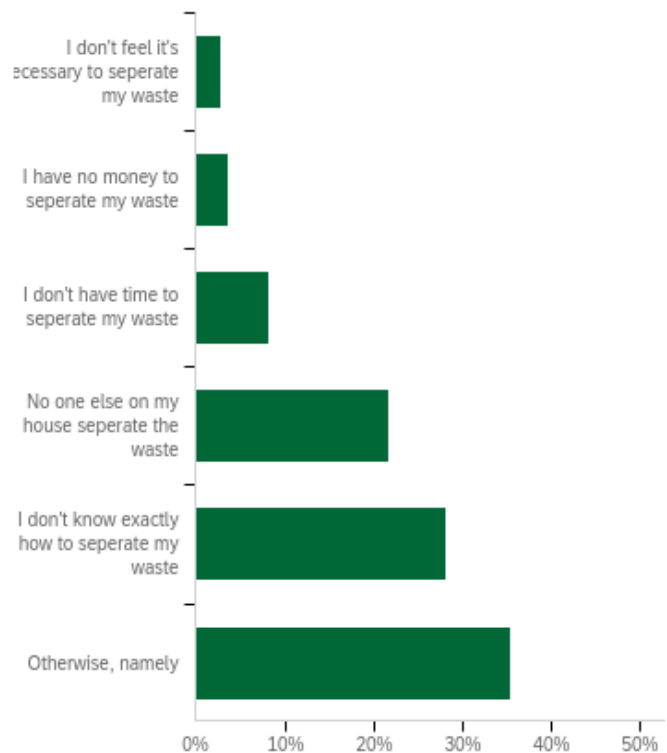


FIGURE 10: REASONS INDICATED BY STUDENTS, OF WHY THEY DO NOT SEPARATE THEIR WASTE

### Factors influencing the PEB

The students were also asked by which factors they were positively or negatively influenced to separate their waste. Most often, the respondents indicated that their family influenced them to separate their waste better (21.8%), followed by the lay-out and facilities of the Radboud campus (19.8%), field of education or lectures (13.2%), friends (11.9%) and relationship (10.9%). On the other hand, respondents state that the factors influencing them to separate their waste worse are mostly by friends (22.8%), followed by side job (20.3%), family (12.7%), otherwise (10.1%), which is mostly aimed at the waste separation facilities at home, and relationship (8.9%).

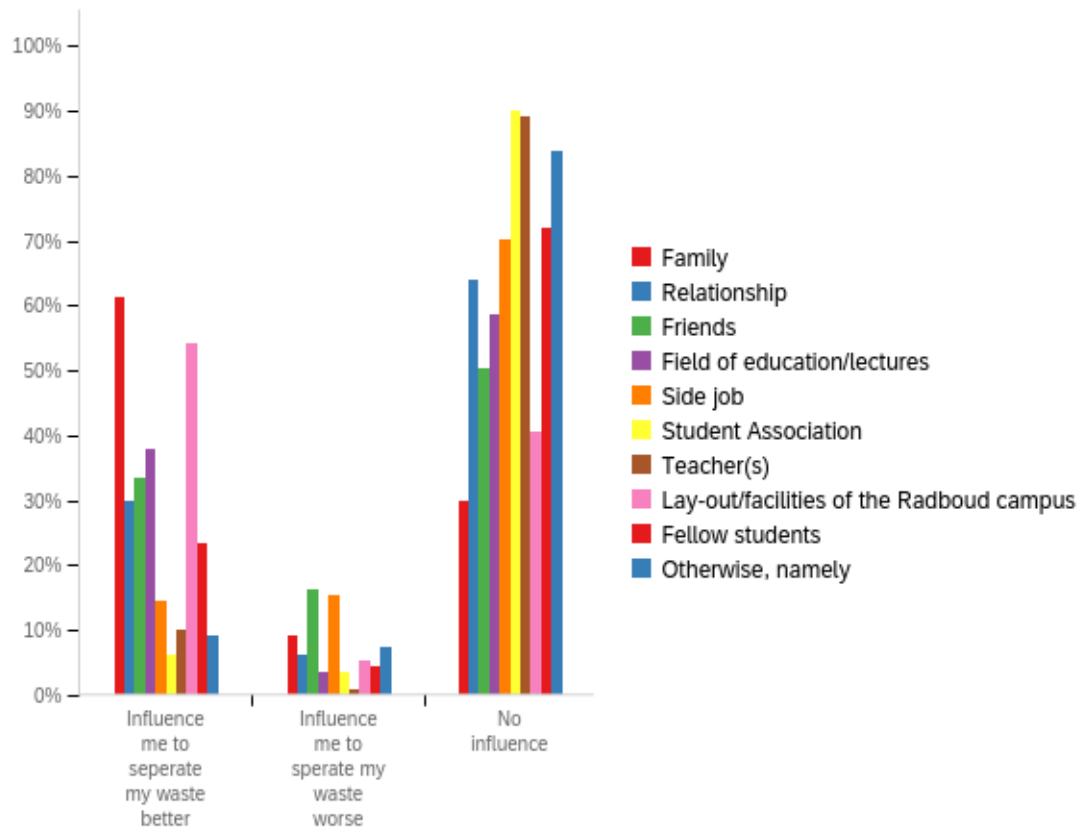


FIGURE 11: DISTRIBUTION OF FACTORS INFLUENCING STUDENTS TO SEPARATE MORE OR LESS WASTE

Comparable to the factors which are thought to influence the pro-environmental behaviour of reducing meat consumption, the factors that are thought to influence the waste separation are also assessed. Similarly, these factors are measured on a scale from 1 to 5. The Radboud students indicated the strength of the factor which resulted in a score of 3.26 on intention, 4.36 on attitude, 3.48 on subjective norm and 3.63 on perceived behavioural control. For the pro-environmental behaviour of separating waste, the Radboud students also indicated their environmental knowledge, which resulted in a score of 5.41 out of 9 points. The system knowledge of the Radboud students is the dimension of knowledge which scores highest, with a 2.53 score out of 3. This dimension is followed by the action-related knowledge, which resulted in a 2.06 score out of 3 points. Lastly, Radboud students score 0.83 out of 3 points on effectiveness knowledge.

TABLE 4: MEAN VALUES, STANDARD DEVIATIONS FOR THE FACTORS INFLUENCING PRO-ENVIRONMENTAL BEHAVIOUR

	Variable	Mean	Std. Dev.
Separating waste	Pro-environmental behaviour	4.37	0.57
	Glass	4.83	0.46
	Paper	4.75	0.61
	Organic waste	3.56	1.58
	Plastic	4.58	0.85
	Batteries	4.15	1.36
	Intention	3.26	1.10

Attitude	4.36	0.78
Subjective norm	3.48	0.81
Perceived behavioural control	3.63	0.86
Environmental knowledge	5.41	1.24
System knowledge	2.53	0.65
Action-related knowledge	2.06	0.69
Effectiveness knowledge	0.83	0.74
Environmental concern	4.05	0.60
Values - self enhancement	2.68	0.92
Values - self transcendence	4.47	0.62

In addition to the factors influencing the specific pro-environmental behaviour, the variables environmental concern and the values self-enhancement and self-transcendence were measured. Similarly, these variables were measured on a scale from 1 to 5. Students score an average of 4.05 on environmental concern, which can be considered high. Additionally, students got a score of 2.68 on self-enhancement and a score of 4.47 on self-transcendence.

#### **4.1.3 Comparing the two behaviours**

In order to see whether the two specific behaviours of reducing meat consumption and separating waste correspond with each other, they are briefly compared. The PEB of separating waste is more than one point higher than the PEB of reducing meat consumption. Gender and years of education have an influence on the PEB of reducing meat consumption, in contrast to the separation of waste. Although liking meat was given as the main reason for meat consumption and the lack of knowledge for that of waste separation, the second most given reason for both PEB is a social aspect, namely that of the direct environment. Students eat meat more often because the people they eat with do so as well, and students who do not separate their waste do so because people they live with do not either. In students' opinion, factors that positively influence their PEB for both specific behaviours are: the field of education, lectures, friends, and the lay-out- or facilities on the Radboud Campus. Factors that students indicate have a negative effect on both their waste separation and meat consumption are: friends, family, side job, and relationship. The role of facilities exclusively plays an important role in the PEB of waste separation and not for meat consumption. The scores for the factors that make up intention seem somewhat comparable for the two specific behaviours. For the PEB of separating waste, attitude scores the highest out of the three factors. For the PEB of reducing meat consumption, PBC is the highest factor. For both PEB's subjective norm is the lowest. Regarding the dimensions of environmental knowledge, students score highest on the system knowledge of separating waste, but for the PEB of reducing meat consumption, students score highest on action-related knowledge. However, students score lowest on effectiveness knowledge for both reducing meat consumption and separating waste.



## **4.2 Correlations**

To get a first insight of the relations between the variables which are thought to influence the pro-environmental behaviour of students, a correlation matrix has been conducted. Table 3 shows these correlations, which indicate whether there consists a negative or positive relationship between variables and indicates the strength of this relationship. Similar to before, a distinction was made between the pro-environmental behaviour of reducing meat consumption, and the pro-environmental behaviour of separating waste.

### **4.4.1 Reducing meat consumption**

To obtain a first insight in the relationships between the factors that are expected to explain pro-environmental behaviour, the correlations between these factors are visualised in table 5. As expected, all correlations are positive, except for self-enhancement. The correlations between attitude, subjective norm, PBC and intention, all have a medium to large effect, according to Field (2018).

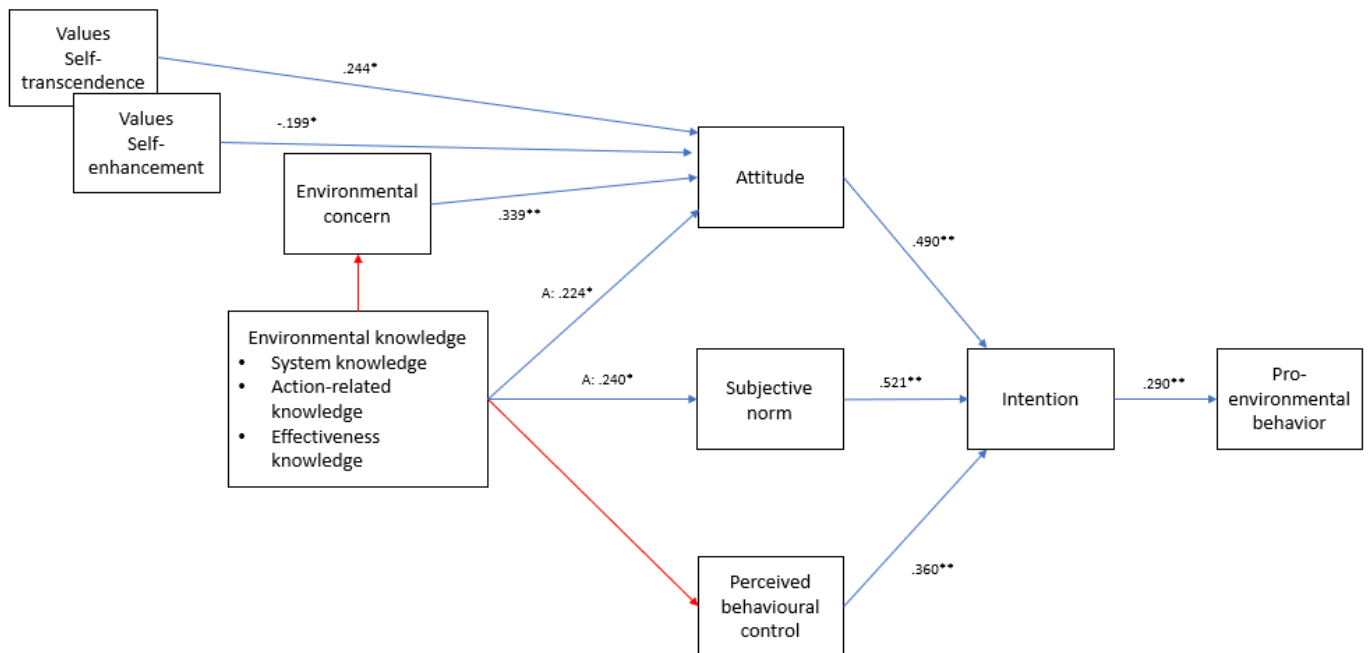
The strongest significant correlation was found between subjective norm and intention, followed by PBC and attitude. The significant correlation between intention and PEB is somewhat smaller, which can be due to the line of questioning. Action-related knowledge significantly correlates with attitude and subjective norm, and not with PBC. In contrast to the expectations, system knowledge and effectiveness knowledge both do not significantly correlate with attitude, subjective norm, PBC, and environmental concern. The two values, self-enhancement and self-transcendence, and environmental concern do correlate significantly with attitude, as was expected. The significant correlations are visualised in the conceptual model (figure 14). The relations between the variables that were not significant are coloured red.

There are also some significant correlations between variables which relations were not taken into account in the conceptual model. PEB correlates directly with the variables attitude, subjective norm, PBC, action-related knowledge, environmental concern, and self-transcendence. Intention also correlates directly with the variable environmental concern, and self-transcendence. Attitude, subjective norm and PBC also correlate significantly with each other. System knowledge correlates significantly with self-transcendence. Environmental concern also correlates relatively strong with the three predictors of intention (attitude, subjective norm and PBC), however, it was expected to only correlate with attitude. Environmental concern also significantly correlates with the two values. The value self-transcendence correlates significantly with subjective norm, PBC, and environmental knowledge.

**TABLE 5: PEARSON CORRELATION FOR THE FACTORS INFLUENCING THE PRO-ENVIRONMENTAL BEHAVIOUR OF REDUCING MEAT CONSUMPTION**

	PEB	Intention	Attitude	Subjective norm	PBC	System knowl.	Action-related knowl.	Effect. knowl.	Env. concern	Self-transcendence	Self-enhancement
PEB	1	,290**	,404**	,444**	,273**	,112	,220*	,083	,367**	,252**	-,131
Intention	,290**	1	,409**	,521**	,360**	,173	,170	,138	,260**	,318**	-,147
Attitude	,404**	,409**	1	,493**	,418**	,048	,224*	,149	,339**	,244*	-,199*
Subjective norm	,444**	,521**	,493**	1	,288**	,182	,240*	,167	,233*	,281**	-,144
PBC	,273**	,360**	,418**	,288**	1	,035	,060	,142	,302**	,262**	-,136
System knowledge	,112	,173	,048	,182	,035	1	,168	,107	,096	,191*	-,003
Action-related knowledge	,220*	,170	,224*	,240*	,060	,168	1	,054	,107	,052	-,218*
Effectiveness knowledge	,083	,138	,149	,167	,142	,107	,054	1	,065	,178	-,141
Environmental concern	,367**	,260**	,339**	,233*	,302**	,096	,107	,065	1	,368**	-,428**
Self-transcendence	,252**	,318**	,244*	,281**	,262**	,191*	,052	,178	,368**	1	-,264**
Self-enhancement	-,131	-,147	-,199*	-,144	-,136	-,003	-,218*	-,141	-,428**	-,264**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed).



**FIGURE 12: PEARSON CORRELATION FOR PEB OF REDUCING MEAT CONSUMPTION**  
 (\* CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL. \*\* CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL)

#### 4.2.2 Separating waste

When looking at the correlations between the factors influencing the pro-environmental behaviour of separating waste, a lot of correlations are not significant (table 6 and table 7). Therefore, not all relations in the conceptual model can be distinguished and are coloured red, as visualised in figure 15. An unexpected finding is the lack of significance of the relationship between intention and pro-environmental behaviour. The relations between the predictors of intention and intention according the theory of planned behaviour are significant and have relative strong relations. The only significant relations left are the correlations between attitude, and system knowledge and action-related knowledge. The three dimensions of knowledge do not significantly correlate with subjective norm and PBC. Environmental concern does, in contrast to the expectations, not significantly correlate with attitude.

However, some correlations which were not taken into account in the original conceptual model, turn out to be significant. PEB directly correlates with attitude, environmental concern and self-transcendence. Intention also directly correlates with environmental concern and self-enhancement. Subjective norm correlates significantly with environmental concern and PBC. The two values significantly correlate with environmental concern.

TABLE 6: PEARSON CORRELATIONS FOR THE FACTORS INFLUENCING THE PRO-ENVIRONMENTAL BEHAVIOUR OF WASTE SEPARATION, PART 1

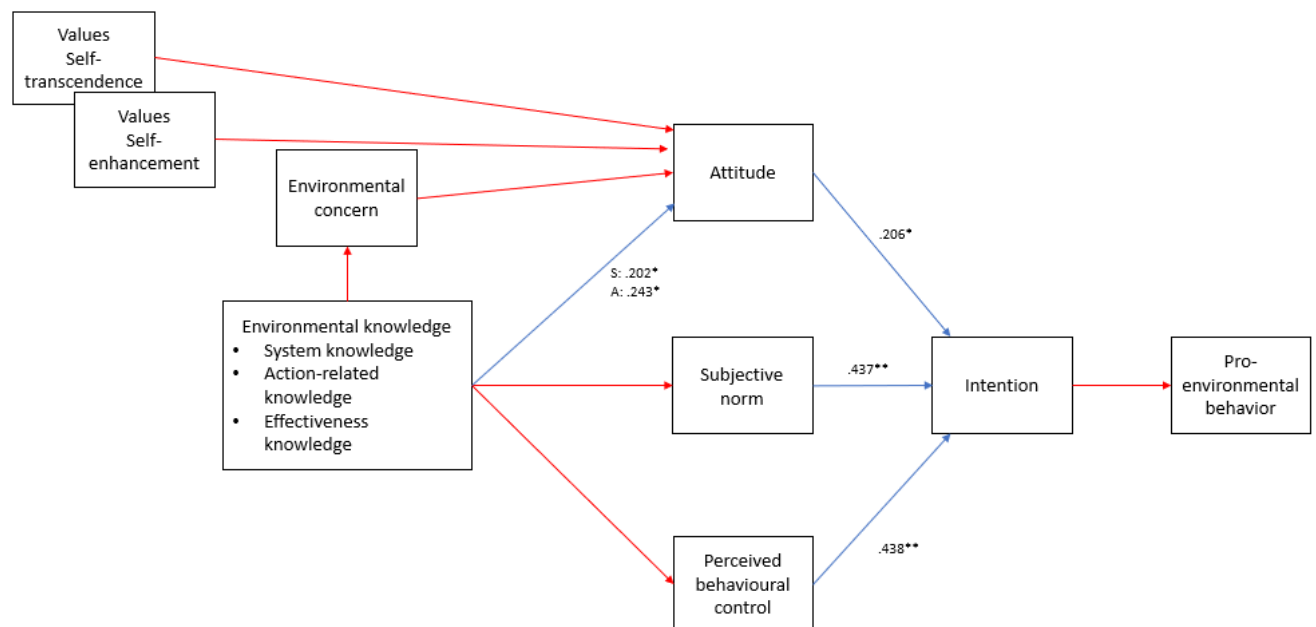
	PEB Glass	PEB Paper	PEB Organic waste	PEB Plastic	PEB Batteries	Intention	Attitude	Subjective norm	PBC
PEB Glass	1	,313**	,115	,245*	,083	-,014	,120	-,018	-,036
PEB Paper	,313**	1	,097	,117	,200*	-,062	,072	-,024	-,144
PEB Organic waste	,115	,097	1	,266**	,155	,166	,247**	,026	,162
PEB Plastic	,245*	,117	,266**	1	,118	,071	,268**	,067	,025
PEB Batteries	,083	,200*	,155	,118	1	,159	,149	,075	-,101
Intention	-,014	-,062	,166	,071	,159	1	,206*	,437**	,438**
Attitude	,120	,072	,247**	,268**	,149	,206*	1	,095	,099
Subject. norm	-,018	-,024	,026	,067	,075	,437**	,095	1	,199*
PBC	-,036	-,144	,162	,025	-,101	,438**	,099	,199*	1
System knowl.	,049	-,085	,113	,058	,142	,025	,202*	,007	,012
Action-related knowl.	,000	,142	,082	,087	,169	,132	,243*	-,052	,093
Effect. Knowl.	-,112	-,055	,013	,000	-,011	,040	,136	,148	,134
Env. conc.	,114	,162	,078	,140	,159	,276**	,072	,228*	,079
Self- transcendence	,057	,057	,073	,141	,020	,088	,083	,272**	,055
Self-enhancement	-,113	-,124	-,157	-,148	-,177	-,190*	-,124	-,165	-,001

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed).

**TABLE 7: PEARSON CORRELATIONS FOR THE FACTORS INFLUENCING THE PRO-ENVIRONMENTAL BEHAVIOUR OF WASTE SEPARATION, PART 2**

	System knowledge	Action- related knowledge	Effect knowledge	Env. concern	Self- transcendence	Self- enhancement
PEB Glass	,049	,000	-,112	,114	,057	-,113
PEB Paper	-,085	,142	-,055	,162	,057	-,124
PEB Organic waste	,113	,082	,013	,078	,073	-,157
PEB Plastic	,058	,087	,000	,140	,141	-,148
PEB Batteries	,142	,169	-,011	,159	,020	-,177
Intention	,025	,132	,040	,276**	,088	-,190*
Attitude	,202*	,243*	,136	,072	,083	-,124
Subjective norm	,007	-,052	,148	,228*	,272**	-,165
PBC	,012	,093	,134	,079	,055	-,001
System knowl.	1	-,025	,176	,088	,145	-,158
Action-related knowl.	-,025	1	-,053	,088	,183	-,147
Effect. Knowl.	,176	-,053	1	-,052	,168	-,068
Env. Conc.	,088	,088	-,052	1	,368**	-,428**
Self- transcendence	,145	,183	,168	,368**	1	-,264**
Self-enhancement	-,158	-,147	-,068	-,428**	-,264**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed). \* . Correlation is significant at the 0.05 level (2-tailed).



**FIGURE 13: PEARSON CORRELATION OF PEB SEPARATING WASTE**  
 (\* CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL. \*\* CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL)

### 4.3 Regression analysis

This section of the analysis is still aimed at answering the second sub-question, but focusses on the factors that influence the PEB of students. This question will be answered on the basis of the

hypotheses, which were drawn up in chapter two. These hypotheses are tested with multiple regression as analysis-technique, which tests whether a factor is a significant predictor of the dependent variable. Since there are more dependent variables in the conceptual model, more separate (multiple) regressions were performed. These six regression analyses were separately conducted for the pro-environmental behaviour of reducing meat consumption and the pro-environmental behaviour of separating waste.

#### **4.3.1 Reducing meat consumption**

The first regression analysis was conducted to evaluate the prediction of pro-environmental behaviour by intention to act. The regression is significant with  $F(1,107) = 9.804$ ,  $p = .002$  and had a  $R^2$  of .084. This means that 8.4% of the variance of the pro-environmental behaviour can be explained by the factor intention. So, intention is a significant predictor of pro-environmental behaviour ( $p = .002$ ), and has a positive effect on intention ( $B = .569$ ,  $\beta = .290$ ), which means that the first hypothesis is supported.

The second analysis is a multiple regression analysis, where the three factors attitude, subjective norm, and PBC are expected to predict intention. This regression model is also significant ( $F(3,105) = 17.350$ ,  $p < .000$ ) and has a  $R^2$  of .331. This means that 33.1% of the variance in intention can be explained by the factors attitude, subjective norm and PBC. These three factors did independently correlate significantly with intention (see 4.2). However, when taking the whole model into account, only subjective norm ( $p < .000$ ) and PBC ( $p = .034$ ) seem to be significant predictors of intention with  $\alpha = .05$ . Attitude ( $p = .180$ ) is not a significant predictor of intention. The significance of the correlation between attitude and intention thus disappears when more predictors are added. Subjective norm ( $B = .568$ ,  $\beta = .402$ ) and PBC ( $B = .321$ ,  $\beta = .190$ ) both have a positive effect on intention, but subjective norm is the most important predictor in this model. Therefore, H2a is not supported, but H2b and H2c are supported.

The third regression analysis is aimed at testing whether the factors values, environmental concern, and the three dimensions of environmental knowledge significantly predict attitude. The regression analysis turned out to be significant ( $F(6,102) = 3.684$ ,  $p = .002$ ) with an  $R^2$  of .178. This means that 17.8% of the total variance of attitude can be explained by these factors. Looking at the six predictors, environmental concern ( $p = .010$ ) and action-related knowledge ( $p = .042$ ) are the only significant predictors of attitude at an  $\alpha = .05$ . Environmental concern ( $B = .443$ ,  $\beta = .273$ ) and action-related knowledge ( $B = .470$ ,  $\beta = .192$ ) both have a positive effect on attitude. Here, environmental concern is the most important predictor of this model. System knowledge ( $p = .625$ ), effectiveness knowledge ( $p = .260$ ), self-transcendence ( $p = .212$ ), and self-enhancement ( $p = .939$ ) are not significant predictors

of attitude. Therefore, the hypotheses H3a, H3c, H7a and H7b cannot be supported, but the hypothesis H3b can be supported.

The fourth regression analysis is aimed at testing the three dimensions of environmental knowledge as predictors of the subjective norm. This regression analysis is significant ( $F(3,105) = 3.807$ ,  $p = .012$ ) with an  $R^2$  of .098. This means that 9.8% of the variance of subjective norm can be explained by the dimensions of environmental knowledge. The second dimension of knowledge, action-related knowledge, is the only significant predictor ( $p = .027$ ) of subjective norm. System knowledge ( $p = .168$ ) and effectiveness knowledge ( $p = .132$ ) are both not significant for  $\alpha$  is .05. Action-related knowledge has a positive effect on subjective norm ( $B = .454$ ,  $\beta = .211$ ). The hypotheses H4a and H4c are not supported, but the H4b is supported.

The fifth regression analysis is conducted to see whether the dimensions of environmental knowledge are a significant predictor of perceived behavioural control. This regression analysis ( $p = .482$ ) is not significant with an  $\alpha$  of .05 and can therefore not be taken into account. The hypotheses H5a, H5b and H5c can thus not be taken into account.

The sixth and last regression analysis to predict the pro-environmental behaviour of reducing meat consumption is whether the dimensions of environmental knowledge are a significant predictor of environmental concern. This regression analysis ( $p = .535$ ) is not significant with an  $\alpha$  of .05 and can thus not be taken into account. The hypotheses H6a, H6b and H6c cannot be supported.

#### **4.3.2 Separating waste**

Similar to the regression analyses of the pro-environmental behaviour of reducing meat consumption, the same regression analyses were done for the pro-environmental behaviour of separating waste.

The first regression analyses should test the hypothesis of the prediction of pro-environmental behaviour by intention. However, as explained in chapter three, the assumptions for conducting this regression analysis have not been met. Therefore, hypothesis cannot be tested.

The second regression analysis, which is a multiple regression analysis, is aimed to test whether the factors attitude, subjective norm, and perceived behavioural control are significant predictors of intention. The multiple regression analysis was significant ( $F(3,104) = 21.758$ ,  $p < .000$ ) with an  $R^2$  of .386. This means that 38.6% of the total variance of intention can be explained by these three factors. While the three factors independently correlate significantly with intention, attitude is no significant predictor ( $p = .154$ ) with an  $\alpha = .05$  when taking into account the variables subjective norm and PBC. These two factors are however significant predictors ( $p < .000$ ) of intention with an  $\alpha = .05$ . Subjective

norm ( $B = .594$ ,  $\beta = .423$ ) and PBC ( $B = .434$ ,  $\beta = .343$ ) both have a positive effect on intention, but subjective norm is the most important predictor when looking at the  $\beta$ . Taking this into account, the hypotheses H2b and H2c can be supported.

The third regression analysis is conducted to test whether the factors values, environmental concern, and the three dimensions of environmental knowledge are significant predictors of attitude. The multiple regression analysis is ( $F(6,102) = 2.299$ ,  $p = .04$ ) with an  $R^2$  of .119. This means that 11.9% of the total variance of attitude can be explained by these six factors. Action-related knowledge ( $p = .010$ ) turns out to be the only significant predictor for  $\alpha = .05$ . System knowledge ( $p = .062$ ), effectiveness knowledge ( $p = .208$ ), environmental concern ( $p = .755$ ), self-transcendence ( $p = .742$ ), and self-enhancement ( $p = .670$ ) are no significant predictors of attitude with an  $\alpha$  of .05. Action-related knowledge ( $B = .282$ ,  $\beta = .250$ ) has a positive effect on attitude. Therefore, the hypothesis H3b can be supported, but the hypotheses H3a, H3c, H7a, H7b, and H7c are not supported.

The fourth regression analysis is conducted to see whether the dimensions of environmental knowledge are significant predictors of subjective norm. However, this regression analysis was not significant ( $p = .457$ ). Thus, the hypotheses H4a, H4b, H4c cannot be supported.

The fifth regression analysis was aimed at testing whether the three dimensions of environmental knowledge are significant predictors of subjective norm. However, this regression analysis is also not significant ( $p = .395$ ) for an  $\alpha$  of .05. Therefore, this analysis cannot be taken into account and the hypotheses H5a, H5b, and H5c cannot be supported.

The sixth and last regression analysis is aimed at testing whether the dimensions of environmental knowledge are significant predictors of environmental concern. This regression analysis turned out to be not significant ( $p = .545$ ). Therefore, the hypotheses H6a, H6b, and H6c cannot be supported.

#### **4.3.3 Regression conclusion**

Table 8 gives an overview of the support for the hypotheses. The first hypothesis is only supported for the PEB of reducing meat consumption, since the analysis regarding the PEB of separating waste could not be conducted. The outcomes of the second hypotheses, which were about the predictors of intention, showed the same results for both specific behaviours. The results show that attitude is not a significant predictor of intention, but to underline subjective norm and PBC as significant predictors, with subjective norm as the most important influential. The outcomes of the third hypotheses, regarding the influence of the dimensions of environmental knowledge on attitude, are also the same for both specific PEB's. Here, only action-related knowledge has a significant influence on attitude. The fourth hypotheses, regarding the influence of the dimensions of environmental knowledge on subjective norm, are not fully the same for both specific behaviours. Here action-related knowledge is

a significant predictor of subjective norm for reducing meat consumption, but not for separating waste. For both the fifth and sixth hypotheses of the influence of the dimensions of knowledge on PBC and environmental concern, none of the predictors were significant. The last hypotheses about the influence of the two values, self-transcendence and self-enhancement, and environmental concern on attitude, differ for both PEB's. Environmental concern was a significant predictor of attitude for the PEB of reducing meat consumption, but not for the PEB of separating waste.

The hypotheses which are underscored indicate that the outcomes do correspond for both PEB's. While a lot of hypotheses are not supported, it is striking that the outcomes of the hypotheses are often the same for both PEB's. This suggests that the two specific behaviours can possibly be generalized to the total PEB of students.

**TABLE 8: OVERVIEW OF WHETHER THE HYPOTHESES ARE SUPPORTED OR NOT SUPPORTED**

<b>Hypotheses</b>		<b>Reducing meat consumption</b>	<b>Separating waste</b>
<b>H1</b>	A high intention to act environmentally responsibly has a positive effect on the pro-environmental behaviour of students.	Supported	-
<b>H2a</b>	A strong attitude towards the behaviour in question results in a higher intention to show this behaviour.	Not supported	Not supported
<b>H2b</b>	A high subjective norm towards the behaviour in question results in a higher intention to show this behaviour.	Supported	Supported
<b>H2c</b>	A high perceived behavioural control towards the behaviour in question results in a higher intention to show this behaviour.	Supported	Supported
<b>H3a</b>	A high system knowledge has a positive effect on attitude.	Not supported	Not supported
<b>H3b</b>	A high action-related knowledge has a positive effect on attitude.	Supported	Supported
<b>H3c</b>	A high effectiveness knowledge has a positive effect on attitude.	Not supported	Not supported
<b>H4a</b>	A high system knowledge has a positive effect on subjective norm.	Not supported	Not supported
<b>H4b</b>	A high action-related knowledge has a positive effect on subjective norm.	Supported	Not supported
<b>H4c</b>	A high effectiveness knowledge has a positive effect on subjective norm.	Not supported	Not supported
<b>H5a</b>	A high system knowledge has a positive effect on perceived behavioural control.	Not supported	Not supported
<b>H5b</b>	A high action-related knowledge has a positive effect on perceived behavioural control.	Not supported	Not supported



<b>H5c</b>	A high effectiveness knowledge has a positive effect on perceived behavioural control.	Not supported	Not supported
<b>H6a</b>	A high system knowledge has a positive effect on environmental concern.	Not supported	Not supported
<b>H6b</b>	A high action-related knowledge has a positive effect on environmental concern.	Not supported	Not supported
<b>H6c</b>	A high effectiveness knowledge has a positive effect on environmental concern.	Not supported	Not supported
<b>H7a</b>	A high value of self-transcendence has a positive effect on the attitude towards the behaviour.	Not supported	Not supported
<b>H7b</b>	A high value of self-enhancement has a negative effect on the attitude towards the behaviour	Not supported	Not supported
<b>H7c</b>	A high environmental concern has a positive effect on the attitude towards the behaviour	Supported	Not supported

#### **4.4 Sustainable oriented activities and facilitation of the Radboud University**

This section is aimed at answering the third sub-question which was proposed in the introduction: *In what ways does the Radboud University try to stimulate the pro-environmental behaviour of her students?* In order to get a view of the current ways of the Radboud University of stimulating the pro-environmental behaviour of students, five interviews were conducted with employees of the Radboud University. The results of these interviews and the literature study on the activities of the Radboud University are summarized below, and are explained on the basis of the three curricula of Hopkinson et al. (2008).

##### **4.3.1 Sustainability within formal curricula**

The Radboud University broadly defines sustainability by incorporating environment and climate, as well as social aspects. In order to define sustainability, the Radboud University takes the Sustainable Development Goals (SDGs) into account, which also address hunger and poverty, since they are convinced that environmental goals are interrelated with social goals (C. Hendriks, personal communication, April 16, 2020; M. Klomp, personal communication, June 24, 2020). In order to reach the goal of a more sustainable Radboud University, in the recent years several new functions and centres have been created, for instance, the Radboud Centre for Sustainability Challenges, and the Radboud Green Office. The Radboud Centre for Sustainability Challenges was set up in 2019, in order to address the SDGs. This centre is an interfaculty initiative aimed at increasing the impact that both education and research of sustainability have on its environment, by connecting the research of different faculties and disciplines (Radboud University, n.d.-b). In addition, they make sure *“that each Radboud University graduate is aware of the concept of sustainability in relation to their field of study, and stimulate the offering of a wide range of courses and study programmes relevant for sustainable*

*development*” (Radboud University, n.d.-c). The Radboud University is convinced that every faculty and every student is connected to and can contribute to sustainability issues within their own discipline (C. Hendriks, personal communication, April 16, 2020). Since every faculty deals with specific sustainability-related topics that fit the discipline, a large part of the SDG’s is covered within the education at the Radboud University (Radboud Universiteit, 2019).

As pointed out before, the number of courses the Radboud University offers wherein sustainability plays a role is growing throughout the years. The ambition the Radboud University holds within its education, is to go beyond offering information, and to educate students in such a way that they have the knowledge and skills to contribute to a more sustainable society based on their own expertise and discipline (C. Hendriks, personal communication, April 16, 2020). The Radboud University sees it as its responsibility to educate generations of students as academics that are capable of making decisions on sustainability in their future careers, whether this is as a researcher, policy maker, or in a company (M. Klomp, personal communication, June 24, 2020). This claim is represented in their sustainability strategy, ‘A Significant Impact’: *“Our students develop into critical thinking academics and are prepared to take responsible positions in society”* (Radboud University, 2019a).

#### **4.3.2 Sustainability within informal curricula**

Since 2018, the Radboud University also has a Green Office on the campus. This office focusses on sustainability in the broadest term and aims to inform, empower, and involve students and employees. They, for instance, facilitate the ‘living lab’ which links sustainability issues on the campus to the education and research of students. Another example of the Radboud University empowering students can be observed in the plans that are being made to implement a sustainability certificate in the nearby future. This sustainability certificate is a distinction added to the bachelor’s degree that is granted to a student when they have followed different courses focussed on sustainability. Finally, students can get a discount at various sustainable shops and bars in Nijmegen with the sustainability sticker of the Green Office, which can be placed on the student card (P. den Hertog, personal communication, April 30, 2020). The Green Office is most directly concerned with the pro-environmental behaviour of students. For instance, by posting how-to videos of sustainable topics, e.g. how to make a vegan meal, how to build your own insect hotel and how to create your own vegetable garden, on social media (M. Klomp, personal communication, June 24, 2020).

#### **4.3.3 Sustainability within campus curricula**

In addition to incorporating sustainability in the education on the Radboud University, the Radboud also integrates sustainability in their own organisation and tries to act like a role model for other organisations and their employees and students (M. Klomp, personal communication, June 24, 2020).

In order to achieve this, the Radboud University tries to propagate and contribute towards sustainability in its environment. With their corporate video of 2019, the Radboud University shows their concern by illustrating an overloaded earth and closing with the quote of Greta Thunberg from the UN COP24 in 2018 *“In the year 2078, I will celebrate my 75<sup>th</sup> birthday. If I have children maybe they will spend that day with me. Maybe they will ask why you didn’t do anything while there still was time to act”* (Radboud University, 2019b). The aim of this video is to bring forth the various challenges that the world faces and call for collective action by scientists, students and engaged citizens in order to ensure a healthy, free world with equal opportunities for all (M. Klomp, personal communication, June 24, 2020). Additionally, the Radboud University aims at transforming its campus into a greener campus with energy efficient and circular buildings, where the newest building of the Faculty of Social Sciences will be energy neutral (Radboud University, 2019a; Radboud University, 2016). Also, the Radboud University aims at the sustainable procurement of goods, which for instance includes the campus thrift shop, where written-off goods are sold and therefore recycled (Radboud University, 2016; M. Klomp, personal communication, June 24, 2020). Furthermore, the Radboud University is increasingly facilitating vegetarian and vegan options throughout the campus’ cafeterias as well as its catering (M. Klomp, personal communication, June 24, 2020). In response to several requests by employees, asking for a more sustainable alternative to their current work phones, the Radboud is planning to add a more sustainable option, like a refurbished iPhone or a Fairphone, to the list of available work phones (M. Klomp, personal communication, June 24, 2020).

#### **4.3.4 Stimulating sustainable behaviour of students**

The Radboud University *“supports and encourages sustainable behaviour of staff and students from the standpoint that every employee and every student is responsible for the sustainability of his or her own behaviour”* (Radboud Universiteit, n.d.-a). The Radboud University aims at informing and facilitating her students to encourage them to make sustainable choices. The first step, according to the Radboud University, is to provide the opportunity for students to make more sustainable choices. This opportunity can be achieved by the availability of sustainable options, but also by providing information. The availability of sustainable options can for instance be seen in the availability of water taps throughout the Radboud campus where students can fill their water bottle, the availability of vegetarian options in the university canteen, or the possibility to get coffee in your own coffee cup throughout most coffee corners on campus, and the possibility to separate the waste on campus. Here, the demands of students are taken into account,



FIGURE 14: WATER TAP ON RADBOUD UNIVERSITY CAMPUS

to see which sustainable facilities are preferred (M. Klomp, personal communication, June 24, 2020). In addition, the Radboud University tries to provide the students with all the information needed to make the right choices, for instance by placing information at the scene of biodiversity projects on campus or by providing information about the vegetarian options in the campus canteen, the Refter. For instance, the Spar on the Radboud campus, provides students with information about the water footprint of their purchases. For every product in the store, the amount of water that is used to produce this product is displayed, to inform students about the impact their purchase has (M. Klomp, personal communication, June 24, 2020).

Since students are free to make their own choices, the Radboud aims at stimulating and informing the students to make sustainable choices, so that they are aware of the choices they make and that they have access to the right information. However, the Radboud sees it as their responsibility, in some cases, to go further than stimulating and take away choices and make decisions for students or employees themselves. The newly introduced flight policy is an example of the ways in which the university takes decisions for their employees and students. When employees need to travel, the new policy keeps them from making short trips by plane. When the destination can be reached within seven hours by an alternative mode, employees are prohibited to travel by plane (Noij & Lambeets, 2020). This new policy is introduced as the Radboud feels the responsibility to act on this topic (M. Klomp, personal communication, June 24, 2020). Additionally, according to a study of two students, employees are prepared to use alternative, more sustainable travel modes, and most of these employees even expect the Radboud University to take measures to reduce the ecological footprint of business trips (Lambeets & Noij, 2020). Another decision the Radboud University makes for their employees, is that the standard option of lunches is now vegetarian, unless employees explicitly ask for meat (M. Klomp, personal communication, June 24, 2020). These sustainable choices of the Radboud University are mostly made for employees. However, the Radboud is aiming to do this for students too on topics where the support for sustainable choices is high among students.

#### ***4.3.5 Reducing meat consumption and separating waste***

The Radboud University has specific goals concerning the meat consumption of students and separating the waste on campus. For the year 2025, the Radboud University wants their vegetarian and vegan products to make up eighty percent of their total food supply on campus, in an effort to reduce meat consumption. Currently this ratio still hovers around forty percent. They aim to reach this goal by gradually increasing the amount of vegetarian and vegan products and reducing the amount of products containing meat (V. Barendregt, personal communication, November 24, 2020). From 2016 till 2019, there were meat-free Mondays in the Refter, the campus cafeteria (Ten Broeke, 2019). This meant that on Monday, only vegetarian or vegan meals were served. While the Radboud University

informed their students and employees about the meat-free Monday through information in the cafeteria, and on the tables, this concept received a fair amount of backlash, since people felt restricted in their freedom of choice. With the reorganisation of the campus cafeteria, the concept of meat free Monday was abandoned, but the range and diversity of vegetarian and vegan options were increased. The Radboud University has used discounts as an incentive to stimulate students to choose for a more environmentally responsible option, where the Radboud University has made vegetarian options 25 cents cheaper than options containing meat (V. Barendregt, personal communication, November 24, 2020).

Regarding separating waste, the goal of 2025 aims at a fifty percent reduction of the total waste in the Radboud campus (V. Barendregt, personal communication, November 24, 2020). In 2016, the Radboud University started a pilot where universal waste bins at the university's library were replaced with waste separation units. In these separation units, plastic coffee cups and residual waste are separately collected. Following which these waste separation units were spread throughout the whole university campus (F. van Groningen, personal communication, November 26, 2020). At locations where a lot of organic waste is created, such as catering facilities, it is also possible to separate organic waste. This organic waste is not included in the regular waste separating units, since the amount of organic waste is not enough to collect separately (Radboud University, n.d.-d). In order to steer students and staff towards separating their waste on campus, the university uses posters, information screens and digital media to inform people about the changes on campus (Radboud Universiteit, 2016). In addition, the Radboud University made sure that the stickers on the waste separation units are clear, by asking their students which sticker informs them best. The Radboud University also performs a 'waste scan' a few times a year, where at a specific location, users of the waste separation units are guided through the separation of a small amount of waste-items, after which they get told whether they did it right (F. van Groningen, personal communication, November 26, 2020).



FIGURE 15: UNIVERSAL WASTE BINS AT THE RADBOUD UNIVERSITY

#### ***4.5 Match between PEB of students and the sustainability-oriented activities of the Radboud University***

This part of the analysis is aimed at answering sub-question four: *“To what extent do the factors that influence the pro-environmental behaviour of students match the sustainable oriented activities of the Radboud University?”*. The results of the quantitative- and qualitative research will be compared in order to see where they match and where they don’t match.

For the PEB’s of both specific behaviours, subjective norm and perceived behavioural control are significant predictors of intention, where subjective norm seems to be the most important predictor. The students also indicated that the reasons for not showing the PEB’s has to do with the actions of people close to them, which also indicates a social pressure. The importance of this subjective norm and the social pressure is not reflected in the sustainability-oriented actions of the Radboud University to empower students to a more sustainable behaviour. Regarding the PBC of students, the Radboud University, for instance, focusses on the price of meals. Vegetarian meals are made cheaper in order to make students perceive that they are able to afford a vegetarian meal.

Out of all the dimensions of knowledge, only action-related knowledge seems to be a significant predictor of attitude for both PEB’s. Providing knowledge, and especially action-related knowledge, is reflected in the actions of the Radboud University. The Green Office of the Radboud, for instance, has made several how-to video’s on sustainable topics. Regarding the separation of waste, the Radboud University provides information on which waste belongs to which waste stream by stickers and ‘waste scans’.

For the PEB of reducing meat consumption, environmental concern was a significant predictor of attitude. The Radboud University mainly shows their concern through the corporate video of 2019, which explains the challenges that the world faces and where they call for collective action by scientists, students and engaged citizens. In addition, they aim to act as a role model for their students when it comes to sustainability, by transforming their campus into a greener campus and building energy efficient buildings.

While the other two dimensions of knowledge, system knowledge and effectiveness knowledge are no significant predictors of attitude, subjective norm or PBC, these dimensions are present in the sustainably oriented activities of the Radboud University. Through courses and lectures, the university transfers system knowledge. Effectiveness knowledge can be witnessed in the information provided by the Radboud University about the impact of certain actions or purchases. However, these two dimensions do not seem to be a significant predictor of the PEB’s.



## 5. Conclusion and recommendations

This chapter is divided into two parts, the conclusion and the recommendations. The first part, the conclusion, is aimed at answering the main research question, proposed in the first chapter. The answer on this question will be generated from all gathered information during this research and will be mainly based on the fourth chapter, where the results of the questionnaire and interviews were discussed. The latter part, the recommendations, is focussed on advising the Radboud University on how to stimulate its students to engage in pro-environmental behaviour.

### 5.1 Conclusion

The conclusion is aimed at answering the main research question: *To what extent does the pro-environmental behaviour of students of the Radboud University, regarding reducing meat consumption and separating waste, correspond with the sustainably oriented actions of the Radboud University?*

In order to determine the pro-environmental behaviour of students, the specific behaviours of separating waste and reducing the meat consumption were assessed. The pro-environmental behaviour of students regarding reducing meat consumption, is on average 3.19 out of 7 and 16.5% of the students eat completely vegetarian. The pro-environmental behaviour of students regarding separating waste is 4.37 out of 5, which is more than one point higher than the PEB for reducing meat consumption. Glass is the best separated waste stream, followed by paper, plastic, batteries and organic waste.

The theory of planned behaviour of Ajzen (1991) was used as a basis for explaining the factors that influence the pro-environmental behaviour of students. This theory states that pro-environmental behaviour is determined by the intention a person has to engage in this behaviour, and in turn, intention is influenced by the three factors: attitude; subjective norm; and perceived behavioural control. In addition to these three factors, environmental knowledge, environmental concern, values and actual control were thought to have an influence on the pro-environmental behaviour of students. The Radboud University is thought to influence the pro-environmental behaviour of students through the factors environmental knowledge, actual control and values specifically. This influence of the Radboud University can take place in the form of formal, informal and campus education.

The subjective norm is the most important factor determining the pro-environmental behaviour of students at the Radboud University. Students seem to be influenced most heavily by their direct environment of family and friends, which points to the perception of social pressure from their environment to act in the same way. Next to subjective norm, the perceived behavioural control of students is also an important factor that determines their pro-environmental behaviour. Thus, if

students believe they are able to perform the pro-environmental behaviour, it is more likely that they will actually perform it as well. In order to increase the PBC of students, specific knowledge, skills, and time are crucial to perform this behaviour. Knowledge, and specifically action-related knowledge, also turned out to be an important determinant of the pro-environmental behaviour of students. In order to achieve a particular goal, the students need to have the right information about what actions are necessary to achieve this goal. The last important factor that influences the pro-environmental behaviour of students is environmental concern. In order to know that a certain behaviour is required, or that an environmentally related problem exists, the students need to have concern for the environment and think it is important to act environmentally responsible. Students also indicated themselves that actual control and subjective norm are important factors for them, which can both positively or negatively influence their pro-environmental behaviour. Therefore, the availability of infrastructure and knowledge to perform the behaviour are thought to positively influence the students at the Radboud University.

The aim of the Radboud University is to facilitate the possibilities for the students to perform pro-environmental behaviour, by providing them with more sustainable alternatives. This measure matches with the importance of the actual control of students, and can also contribute to the perceived behavioural control. The Radboud University also provides the necessary knowledge to act environmentally responsible to their students. They do this by integrating sustainability in the education of every student, but also by disseminating action-related knowledge through how-to videos and providing information at the location where a sustainability-oriented activity can be performed. Next to providing knowledge, the Radboud University also aims to act as a role model for its students, by showing their concern for the environmental problems, and by implementing sustainability on their campus and into their organisation. The Radboud University aims to influence their students through all three curricula, stated by Hopkinson et al. (2008). However, most influences regarding pro-environmental behaviour go through the campus curriculum, which thus seems like the most important curriculum.

Specifically focussing on reducing the meat consumption of students, the Radboud University mainly tries to stimulate their students in reducing their meat consumption by increasing the product range of vegetarian and vegan food, and at the same time reducing the amount of food-items that contain meat. In addition, they try to steer students towards making sustainable choices by giving a price incentive, which makes the vegetarian option cheaper than the option that contains meat. However, there is no specific focus on informing students on why it is environmentally responsible to reduce one's meat consumption, or on the impact students can make by eating less meat. In respect of waste



separation of students, the Radboud University provides students with waste separation units throughout the campus, and aims to actively inform the students about which product belongs to which waste stream.

To return to the main research question, several factors for influencing the pro-environmental behaviour of students match with the sustainability-oriented activities of the Radboud University. Environmental knowledge, specifically action-related knowledge, actual control, perceived behavioural control and environmental concern are all factors which the Radboud University aims to influence in order to promote sustainable behaviour among their students, and where the students of the Radboud University were actually influenced by. As for the reduction of meat consumption by Radboud Students, the Radboud University aims to rearrange the product range of their food supply and at the same time make vegetarian meals cheaper, thereby steering students into making sustainable choices by focussing on actual control and perceived behavioural control. In an attempt to stimulate students to separate their waste at the Radboud campus, the university provides the possibility to separate waste and provides knowledge on how to separate this waste. Here, the Radboud University thus focusses on actual control and action-related knowledge.

Aside from the matching factors, a few factors which are important for influencing the students to act environmentally responsible, are not visible in the sustainable oriented actions of the Radboud University. Subjective norm is, for instance, a factor which influences students strongly in the development of pro-environmental behaviour, but this factor is not directly addressed by the Radboud University. Also, while the focus for separating waste is on informing the students, the information about how and why to reduce the meat consumption is still lacking. Therefore, subjective norm and knowledge are two important factors that are (partially) lacking in the sustainability-oriented activities of the Radboud University when aiming to influence the pro-environmental behaviour of students. To conclude, the Radboud University is on the right path for stimulating their students to act responsible. The Radboud University does so through education, but also by providing the necessary infrastructure on campus, providing information, and by acting as a role-model for more sustainable environment. However, the Radboud University could do more to stimulate students by strengthening their resistance to social pressure by friends and family, and to strengthen the perception students have on their ability to make a difference. In addition, the Radboud University should keep informing students on why it is necessary to act environmentally responsible and how they could act this way.

## **5.2 Recommendations**

While the sustainably oriented actions of the Radboud University often accorded with the factors that influence PEB of students, there were some discrepancies as well. The biggest discrepancy is the factor of subjective norm, but at the same time this factor offers the most opportunities to improve on. Students are strongly influenced by their immediate environment such as friends and family. This is a difficult factor for the university to influence, as it one's perception of society's expectations to engage in certain behaviour. The Radboud University can respond to this social pressure in two ways. They can increase the social pressure to engage in pro-environmental behaviour, or they can decrease the social pressure to engage in environmentally irresponsible behaviour. In the first case, the Radboud University can emphasize the amount of students or staff at the university that already make an environmentally responsible choice, for instance by stating that a certain percentage of students chooses for a vegetarian meal two times a week. When aiming at decreasing the social pressure, the Radboud University can for instance work on the prejudices and maybe negative views of eating vegetarian meals. Next to subjective norm, a discrepancy can also be witnessed in the action-related knowledge provided by the Radboud University, especially regarding the reduction of meat consumption. The Radboud University can increase the information about how to replace meat in a responsible way, by stating at a vegetarian meal or product how much of the nutrients are replaced, giving the students an idea of how much nutrients they replace.

In addition to the changes the Radboud University should consider, it is also important to mention that they should maintain their course on the factors they have already started to invest in, moreover increase their efforts in these initiatives. They can achieve this by continuing to act like a role model that gives students a good example of how to act environmentally responsible. It is also useful to keep informing about environmental problems and especially on how to act, individually or collectively, against these problems. The Radboud University should maintain steering people with price incentives, which is part of the PBC. The Radboud University can for instance aim to decrease the costs for environmental responsible actions, like receiving a discount for bringing your own cup when buying coffee. However, the Radboud University can also increase the costs for environmentally irresponsible actions, like attaching a fee to the use of a single-use coffee cup. In addition, the Radboud University can aim to make the performance of pro-environmental behaviour as easy as possible, which could result in less students giving up on their pro-environmental behaviour when things get difficult or take too long.

## 6. Discussion

The last chapter of this thesis discusses the results and conclusions of the research. This discussion is divided into a theoretical- and methodological reflection, and suggestions for future research. The theoretical reflection will address theories used in this thesis and whether or not these theories did hold up in this thesis. The methodological reflection discusses the problems and limitations of this research regarding the methods used. The suggestions for future research will suggest possible limitations or findings that can be addressed in future research.

### 6.1 Theoretical reflection

As a basis for this thesis, the theory of planned behaviour of Ajzen (1991) was used. To broaden this theory, the factors environmental knowledge, values and environmental concern were added to this theory. The outcomes of the analyses of this thesis verify the basic part of the theory of planned behaviour, where intention predicts the pro-environmental behaviour. In addition, the two of the three predictors of intention, subjective norm and perceived behavioural control, were verified in this thesis. Attitude, however, proved not to be a significant predictor of intention. This is striking, since attitude is a widely proven predictor of intention and pro-environmental behaviour. It is possible that these analyses did not result in significant outcomes, because the variable was not measured accurately.

Only action-related knowledge and environmental concern were proved to be significant predictors of attitude, while the factors values, and system- and effectiveness knowledge turned out not to be significant predictors of attitude. Here, it is possible that these factors did not turn out to be predictors of attitude, because they influenced other factors than attitude. This is a plausible explanation, since a lot of correlations were found which were not taken into account in the conceptual model. This explanation therefore argues that the proposed conceptual model and hypotheses were not correct, and that the predictors' influence is mediated through other predictors of intention, such as the subjective norm and PBC.

Since the aforementioned findings were the same for both behaviours of separating waste and reducing meat consumption, it is likely that this theory is generalizable to other specific pro-environmental behaviours as well. From the factors environmental knowledge, values and environmental concern, only environmental knowledge was a significant predictor for both specific behaviours. Environmental knowledge was divided into three dimensions: system knowledge; action-related knowledge; and effectiveness knowledge. Out of these three dimensions, only action-related

knowledge proved to be an influencing factor in this thesis. The factor environmental concern only proved to be relevant for the behaviour of reducing meat consumption.

The theory from Hopkinson et al. (2008), on the influence of higher education on the pro-environmental behaviour of students, did give a clear structure for dividing the influence of the Radboud University on students. The three curricula, formal-, informal-, and campus curriculum, did all three occur within the actions of the Radboud University on influencing their students.

## **6.2 Methodological reflection**

A questionnaire was spread online in order to gather the necessary data for finding out which factors influence the pro-environmental behaviour of students. Due to Covid-19, it was not possible to physically spread and promote the questionnaire on campus. Therefore, the questionnaire was just spread amongst personal networks. This may have jeopardized the generalizability, and the external validity of the research. Due to the relatively high number of respondents, the impact on the external validity won't matter much (Field, 2018).

As explained in chapter three, the internal validity can be questioned since the students report their own behaviour. It was impossible to counteract these influences due to the lack of resources for objective measurement of behaviour. In chapter three it is also mentioned that the reliability of the measuring instruments is partly reassured, because the questionnaire was set up on the basis of Ajzen et al. (2011). These researchers have done more questionnaires with the considered variables, which makes it more reliable. However, the questions for the dimensions of environmental knowledge were put together independently, which makes the results for this variable less reliable. Just one dimension of knowledge, action-related knowledge, showed a significant relation with a one of the predictors of intention. This lack of significant relations for the other two dimensions of knowledge can possibly be due to the inaccurate measuring instrument.

Considering the feedback on the questionnaire, it seemed that several respondents did not understand the line of questioning. This was expected, since the questioning method that was applied did dedicate more questions to the same variable. Some respondents did find this confusing, which might have led to inaccurate answers. Another striking finding was that a lot of analyses of the influence of other predictors were not significant. There is no clear explanation for why this happened, but it is possible that the measuring instrument was not fully adequate, as stated before, and has to be expanded or adjusted to get a significant outcome.

In addition, the actual control of students was measured through asking whether certain control issues were the reason for their lack of pro-environmental behaviour. The actual control itself was not

measured and therefore, the influence of the actual control could not be determined. The dotted line in the conceptual model between the factor actual control and PEB shows that this relation is reasoned instead of statistically measured. Therefore, the validity of this relation is lower than of the other relations.

### ***6.3 Suggestions for future research***

Since not all factors proved to be significant predictors of pro-environmental behaviour in the way that was laid out in the conceptual model, it could prove useful to further address these relations. While the conceptual model was built following the existing theories and expectations, the outcomes were not as expected. Therefore, it might be useful to do some explorative research to test which mediators through pro-environmental behaviour are relevant. In addition, during the analysis of the results, some relations have been found, which were not taken into account in the original conceptual model. These relations were mainly found during the correlations between variables. A striking finding was the correlation between both values and environmental concern for both the PEB's. A significant correlation was also found between self-transcendence and subjective norm and PBC. Therefore, it seems necessary to further research these relationships.

This research was limited to only two kinds of specific pro-environmental behaviour, reducing meat consumption and separating waste. Since there are more specific PEB's relevant for students, for instance transportation or holidays, it would be useful to repeat the same questionnaire for other kinds of pro-environmental behaviour. Considering the big difference between men and women for the PEB of reducing meat consumption, it might be interesting to look into this difference and see if there are other factors influencing the PEB when you divide the data by gender. Finally, it would be useful to further look into the knowledge dimensions and how they are represented within education and educational institutions.

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control and the theory of planned behavior. *Journal of applied social psychology*, 32(4), 665-683.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs.
- Ajzen, I., Jocyce, N., Sheikh, S., & Cote, N. G. (2011). Knowledge and the prediction of behavior: The role of information accuracy in the theory of planned behavior. *Basic and applied social psychology*, 33(2), 101-117.
- Anderson, A. (2012). Climate change education for mitigation and adaptation. *Journal of Education for Sustainable Development*, 6(2), 191-206.
- Bamberg, S. (2003). How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. *Journal of Environmental Psychology*, 23(1), 21-32.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122-147.
- Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Local environment*, 4(3), 257-278.
- Blok, V., Wesselink, R., Studynka, O., & Kemp, R. (2015). Encouraging sustainability in the workplace: a survey on the pro-environmental behaviour of university employees. *Journal of Cleaner Production*, 55-67.
- Braun, T., & Dierkes, P. (2019). Evaluating three dimensions of environmental knowledge and their impact on behavior. *Research in Science Education*, 49(5), 1347-1365.
- Brundtland, G. H., Khalid, M., Agnelli, S., Al-Athel, S., & Chidzero, B. (1987). *Our common future*. New York.
- Bryman, A. (2016). *Social research methods*. Oxford university press.
- Chan, K. (1999). Market segmentation of green consumers in Hong Kong. *Journal of International Consumer Marketing*, 12(2), 7-24.
- Chaplin, G., & Wyton, P. (2014). Student engagement with sustainability: understanding the value-action gap. *International Journal of Sustainability in Higher Education*, 15(4), 404-417.
- Corcoran, P. B., & Wals, A. E. (2004). *Higher education and the challenge of sustainability*. Dordrecht: Kluwer Academic Publishers.

- Cordano, M., Welcomer, S., Scherer, R., Pradenas, L., & Parada, V. (2010). Understanding cultural differences in the antecedents of pro-environmental behaviour: A comparative analysis of business students in the United States and Chile. *The Journal of Environmental Education*, 41(4), 224-238.
- Creswell, J. (2015). Using mixed methods research [Streaming video]. SAGE Research Methods. Retrieved April 29, 2020
- Creswell, J. W. (2013). *Qualitative inquiry and research design: choosing among five approaches*. SAGE.
- De Groot, J. I., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior. How to measure egoistic, altruistic and biospheric value orientations. *Environment and behavior*, 40(3), 330-354.
- Feeley, T. H., & Servoss, T. J. (2005). Examining college students' intentions to become organ donors. *Journal of health communication*, 10(3), 237-249.
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics (5th ed.)*. SAGE Publications.
- Finger, M. (1994). From knowledge to action? Exploring relationships between environmental experiences, learning, and behavior. *Journal of social issues*, 50(3), 141-160.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behaviour: The reasoned action approach*. New York: Psychology press.
- Foster, J., Barkus, E., & Yavorsky, C. (2006). *Understanding and using advanced statistics*. SAGE Publications.
- Fransson, N., & Gärling, T. (1999). Environmental concern: conceptual definitions, measurement methods and research findings. *Journal of Environmental Psychology*, 19(4), 369-382.
- Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Personality and Individual differences*, 37(8), 1597-1613.
- Fuhrer, U., Kaiser, F. G., Sieler, J., & Maggi, M. (1995). From social representations to environmental concern: the influence of face to face versus mediated communication. In U. Fuhrer, *Ökologisches Handeln als sozialer Prozess* (pp. 61-75). Basel: Birkhäuser.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin, & Y. S. Lincoln, *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.
- Het Groene Brein. (2015). *Rapportage onderzoek Duurzaam Onderwijs*.
- Hopkinson, P., Hughes, P., & Layer, G. (2008). Sustainable graduates: linking formal, informal and campus curricula to embed education for sustainable development in the student learning experience. *Environmental Education Research*, 14(4), 435-454.

- Inoue, Y., & Alfaro-Barrantes, P. (2015). Pro-environmental behavior in the workplace: a review of empirical studies and directions for future research. *Business and Society Review*, 120(1), 137-160.
- Jensen, B. B. (2002). Knowledge, action and pro-environmental behaviour. *Environmental Education Research*, 8(3), 325-334.
- Kaiser, F. G., & Fuhrer, U. (2003). Ecological behavior's dependency on different forms of knowledge. *Applied Psychology*, 52(4), 598-613.
- Kaiser, F., Roczen, N., & Bogner, F. (2008). Competence formation in environmental education: advancing ecology-specific rather than general abilities. *Umweltpsychologie*, 12(2), 56-70.
- Kanne, P., Van Hofweegen, T., Kooiman, K., & Van Engeland, W. (2019). *Duurzaam denken is nog niet duurzaam doen*. Amsterdam: I&O Research.
- Karp, D. G. (1996). Values and their effect on pro-environmental behavior. *Environment and behavior*, 28(1), 111-133.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
- Kormos, C., & Gifford, R. (2014). The validity of self-report measures of pro environmental behavior: A meta-analytic review. *Journal of Environmental Psychology*, 40, 359-371.
- Korzilius, H. (2008). *De kern van survey-onderzoek*. Assen: Van Gorcum.
- Kuhlemeier, H., Van den Bergh, H., & Lagerweij, N. (1999). Environmental knowledge, attitudes and behavior in Dutch secondary education. *The Journal of Environmental Education*, 30(2), 4-14.
- Lambeets, K., & Noij, M. (2020, March 12). Voor korte afstanden nemen wetenschappers nog (te) vaak het vliegtuig. Retrieved July 8, 2020, from VOX: <https://www.voxweb.nl/nieuws/voor-korte-afstanden-nemen-wetenschappers-nog-te-vaak-het-vliegtuig>
- Lambrechts, W., Van den Haute, H., & Vanhoren, I. (2009). *Duurzaam hoger onderwijs. Appel voor verantwoord onderrichten, onderzoeken en ondernemen*. Leuven: LannooCampus.
- Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503-520.
- Lozano, R., Lukman, R., Lozano, F., Huisingh, D., & Lambrechts, W. (2013). Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *Journal of Cleaner Production*, 48, 10-19.
- Lundholm, C. (2019). Where to look and what to do? Blank and bright spots in research on environmental and climate change education. *Environmental Education Research*, 25(10), 1427-1437.



- Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth*. New York.
- Meyer, A. (2016). Heterogeneity in the preferences and pro-environmental behavior of college students: the effects of years on campus, demographics, and external factors. *Journal of Cleaner Production*, 112(4), 3451-3463.
- Monroe, M. C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review*, 10(2), 113-125.
- Nejati, M., & Nejati, M. (2013). Assessment of sustainable university factors from the perspective of university students. *Journal for Cleaner Production*, 48, 101-107.
- Noij, M., & Lambeets, K. (2020, March 12). Nieuw vliegbeleid gaat dit jaar in, universiteit doet korte vluchten in de ban. Retrieved July 8, 2020, from: <https://www.voxweb.nl/nieuws/nieuw-vliegbeleid-gaat-dit-jaar-in-universiteit-doet-korte-vluchten-in-de-ban>
- Nye, M., & Hargreaves, T. (2010). Exploring the social dynamics of pro environmental behavior change: A comparative study of interventions processes at home and work. *Journal of Industrial Ecology*, 14(1), 137-149.
- O'Brien, K. (2012). Global environmental change III: Closing the gap between knowledge and action. *Progress in Human Geography*, 37(4), 587-596.
- Oğuz, D., Çakci, I., & Kavas, S. (2010). Environmental awareness of University Students in Akara, Turkey. *African Journal of Agricultural Research*, 5(19), 2629-2636.
- Oreg, S., & Katz-Gerro, T. (2006). Predicting pro-environmental behavior cross-nationally. *Journal of Cleaner Production*, 38(4), 462-483.
- Radboud Universiteit. (2016) Pilot gescheiden inzamelen van afval in UB. Retrieved November 25, 2020, from <https://www.ru.nl/duurzaamheid/@1057524/pilot-gescheiden-inzamelen-afval-ub/>
- Radboud Universiteit. (2019). Jaarverslag 2018. Retrieved July 8, 2020, from [https://www.ru.nl/publish/pages/736207/ru\\_jv\\_2018\\_opmaak-nl\\_v08.pdf](https://www.ru.nl/publish/pages/736207/ru_jv_2018_opmaak-nl_v08.pdf)
- Radboud Universiteit. (n.d.-a). Duurzame doelstellingen Radboud Universiteit. Retrieved March 9, 2020, from <https://www.ru.nl/duurzaamheid/organisatie-0/ambitie/doelstellingen/>
- Radboud Universiteit. (n.d.-b). Feiten & Cijfers. Retrieved April 29, 2020a, from Radboud Universiteit: <https://www.ru.nl/over-ons/overradboud/feiten-cijfers/>
- Radboud University. (2016). *Sustainability Agenda 2016-2020*.
- Radboud University. (2019a). *A significant impact*.
- Radboud University. (2019b). *Je bent nodig*. Retrieved July 8, 2020, from <https://www.youtube.com/watch?v=OGD4WOg0rBk>

- Radboud University. (n.d.-a). Occupational Health & Safety and Environmental Service. Retrieved April 29, 2020, from Radboud University: <https://www.ru.nl/amduk/>
- Radboud University. (n.d.-b). Radboud Centre for Sustainability Challenges. Retrieved July 8, 2020, from Radboud Universiteit: <https://www.ru.nl/duurzaamheid/onderzoek/radboud-centre-for-sustainability-challenges/>
- Radboud University. (n.d.-c). What is the Radboud Centre for Sustainability Challenges? Retrieved July 8, 2020, from Radboud Universiteit: <https://www.ru.nl/sustainability/research/radboud-centre-for-sustainability-challenges-0/virtuele-map/what-the-radboud-centre-for-sustainability/>
- Radboud University. (n.d.-d) Waste separation. Retrieved, November 25, 2020, from Radboud University: <https://www.ru.nl/propertymanagement/sustainability/waste-separation/>
- Rioux, L. (2011). Promoting pro-environmental behavior: collection of used batteries by secondary school pupils. *Environmental Education Research*, 17(3), 353-373.
- RootAbility & Leuphana University. (2019) Green Office Model Guide. Retrieved November 27, 2020, from <https://www.greenofficemovement.org/sustainability-resources/>
- Roth, C. (1992). Environmental literacy: its roots, evolution and directions in the 1990s. Columbus OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309-317.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407-424.
- Stern, P. C., Dietz, T., & Guagnano, G. A. (1998). A brief inventory of values. *Educational and psychological measurement*, 58(6), 984-1001.
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: the case of environmental concern. *Human Ecology Review*, 6, 81-97.
- Stern, P. C., Dietz, T., Ruttan, V. W., Socolow, R. H., & Sweeney, J. L. (1997). Consumption as a problem for environmental science. In P. C. Stern, T. Dietz, V. W. Ruttan, R. H. Socolow, & J. L. Sweeney, *Environmentally significant consumption: research directions* (pp. 1-11). Washington, D.C.: National academy press.
- Summers, D., & Cutting, R. (2016). *Education for sustainable development in further education*. London: Palgrave Macmillan.
- Ten Broeke, P. (2019) Nieuwe Refter stopt met Meat Free Monday. Retrieved November 25, 2020 from: <https://www.voxweb.nl/nieuws/nieuwe-refter-stopt-met-meat-free-monday>

- Thøgersen, J. (2005). How may consumer policy empower consumers for sustainable lifestyles? *Journal of Consumer Policy*, 28(2), 143-178.
- Thøgersen, J., & Schrader, U. (2012). From knowledge to action - new paths towards sustainable consumption. *Journal of Consumer Policy*, 35(1), 1-5.
- Trochim, W. M. (2020). *Philosophy of Research: Deduction & Induction*. Retrieved March 13, 2020, from <https://socialresearchmethods.net/kb/deduction-and-induction/>
- UNECE. (2012). *Learning for the future: competences in education for sustainable development*. Geneva: Strategy for Education for Sustainable Development.
- UNESCO. (1990). The Talloires Declaration. Retrieved from <http://ulsf.org/wp-content/uploads/2015/06/TD.pdf>
- UNESCO. (2014). *Shaping the future we want. UN Decade for education for sustainable development (2005-2014) Final report*. Paris: United Nations Educational, Scientific and Cultural Organisation.
- Van Thiel, S. (2014). *Research methods in public administration and public management: An introduction*. New York: Routledge.
- Verschuren, P., & Doorewaard, H. (2010). *Designing a Research Project*. The Hague: Eleven International Publishing.
- Vincente-Molina, M. A., Fernández-Sáinz, A., & Izagirre-Olaizola, J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *Journal of Cleaner Production*, 61, 130-138.
- Yzer, M. (2013). Reasoned Action Theory: Persuasion as belief-based behavior change. In J. P. Dillard, & L. Shen, *The SAGE handbook of persuasion: Developments in theory and practice*. Thousand Oaks, CA: SAGE publications.
- Zsóka, A., Szerényi, Z. M., Széchy, A., & Kocsis, T. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. *Journal of Cleaner Production*, 48, 126-138.

## Appendix I: Survey questions

	Question	Answer categories
<b>Introduction</b>		
<b>Radboud student</b>	Are you enrolled at Radboud University?	Yes
		No
<b>Gender</b>	What is your gender?	Male
		Female
		Otherwise/I prefer not to say
<b>Age</b>	What is your age?	
<b>Kind of education</b>	Are you currently participating in a bachelor, pre-master or master at Radboud University?	Bachelor
		Pre-master
		Master
		Otherwise, namely
<b>Faculty</b>	At which faculty do you follow this course?	Faculty of Philosophy, Theology and Religious Studies
		Faculty of Arts
		Nijmegen School of Management
		Radboud University Medical Centre
		Faculty of Science
		Faculty of Law
<b>Years of education</b>	How many years (in total ) have you been a student?	Faculty of Social Sciences
		1st year
		2nd year
		3rd year
		4th year
		5th year
		6th year
<b>Pro-environmental behaviour</b>	How many days a week do you eat meat?	7th year or more
		None
		1
		2
		3
		4
		5
		6
		7
<b>Actual control</b>	Which of the options below make you eat vegetarian less often?	I like to eat meat
		Meat substitutes are too expensive
		I eat with people who want to eat meat (parents / roommates / friends)

		I don't have time to cook vegetarian
		I don't know how best to prepare a vegetarian dish
		I don't like meat substitutes
		I am satisfied with my current distribution of meat and vegetarian food
		Otherwise, namely
<b>Intention</b>	<b>Answer per statement to what extent you agree with this</b>	
	I am planning to eat less meat this year	Five point scale
	I am likely to eat less meat this year than before	Strongly disagree – Strongly agree
	I have decided to eat less meat this year	
	I expect I will eat less meat this year	
	<b>Answer per statement to what extent you agree with this</b>	
	I will probably eat less meat this year	Five point scale Definitely not - Definitely
<b>Attitude</b>	<b>Answer per statement to what extent you agree with this</b>	
	I'm in favour of eating less/no meat	Five point scale
	Eating less/no doesn't do any good (reversely coded)	Strongly disagree – Strongly agree
	It's a good idea to eat less/no meat	
	Eating less/no meat is important to me	
<b>Subjective norm</b>	<b>Answer per statement to what extent you agree with this</b>	
	People whose opinion I care about approve of me eating less meat this year	Five point scale
	People I care about would encourage me to eat less meat this year	Strongly disagree – Strongly agree
	I feel social pressure to eat less meat this year	
	Most of the people who are important to me currently eat less meat	
	<b>Answer per statement to what extent you agree with this</b>	
	Most people like me are going to eat less meat this year	Five point scale Very unlikely- very likely
<b>Perceived behavioural control</b>	<b>Answer per statement to what extent you agree with this</b>	
	If I wanted to, I could easily eat less meat this year	Five point scale
	Whether I eat less meat this year is entirely up to me	Strongly disagree – Strongly agree
	I should have no trouble eating less meat this year	
	Eating less meat this year is under my control	
	It is impossible for me to eat less meat this year (reversely coded)	

Influence Radboud university	Indicate whether the following factors influence your choices about eating meat	
	Family	Influence me to eat more meat
	Relationship	Influence me to eat less meat
	Friends	No influence
	Field of education/ lectures	
	Side job	
	Student Association	
	Teacher(s)	
	Lay-out / facilities Radboud campus	
	Fellow students	
	Otherwise, namely	
System knowledge	For the average Dutch person, meat causes ... percent of the climate load through food.	25
		50
		40
	The production of one kilogram of meat requires ... kilograms of vegetable fodder.	2
		4
		5
	A quarter of the world's water consumption goes to the production of animal products.	True / False
Action- related knowledge	Chicken leaves a bigger CO2 footprint than beef.	True / False
	The nutrients in meat can be replaced by eating ...	Vegetables
		Legumes / beans
		Nuts
		Tofu
	Eating less or no meat ensures that ...	Less water is used
		Fewer forests are cut down
		Less greenhouse gases are emitted
Effectiveness knowledge	By not eating meat twice a week, one can annually save ... kg of CO2 emission	75
		170
		130
	The production of one kilogram of ground beef produces about ... times as much CO2 emissions as the production of one kilogram of legumes.	10
		16
		20
	The production of four kilos of beef produces as much CO2 emission as ...	A car ride from Maastricht to Rome
		A car ride from Maastricht to Barcelona
		A car ride from Maastricht to Paris
Separating waste		
Pro- environmenta l behaviour	To what extent do you separate the following types of waste?	
	Glass	Five point scale

	Paper	Never – always	
	Organic waste		
	Plastic		
	Batteries		
Actual control	Which of the following options are reasons for you to not separate your waste?	I don't have time to separate my waste	
		No one else in my house separates the waste	
		I don't feel it's necessary to separate my waste	
		I have no money to separate waste	
		I don't know exactly how to separate my waste	
		Otherwise, namely	
Intention	Answer per statement to what extent you agree with this		
	I plan to separate my waste better this year	Five point scale Strongly disagree – Strongly agree	
	I am likely to better separate my waste this year than before		
	I have decided to separate my waste better this year		
	I expect to separate my waste better this year		
	Answer per statement to what extent you agree with this		
	I will probably separate my waste better this year	Five point scale Definitely not – Definitely	
	Attitude	Answer per statement to what extent you agree with this	
		I am in favour of waste separation	Five point scale Completely disagree – Completely agree
		Separating waste doesn't do any good (reversely coded)	
It is a good idea to separate waste			
Separating waste is important to me			
Subjective norm	Answer per statement to what extent you agree with this		
	People whose opinions I care about approve of me separating my waste better this year	Five point scale Strongly disagree – strongly agree	
	People I care about would encourage me to better separate my waste this year		
	I am feeling social pressure to better separate my waste this year		
	Most of the people who are important to me currently separate their waste		
	Answer per statement to what extent you agree with this		
	Most people like me are going to separate their waste this year	Five point scale Extremely unlikely – extremely likely	

<b>Perceived behavioural control</b>	<b>Answer per statement to what extent you agree with this</b>	
	If I wanted to, I could easily separate my waste better this year	Five point scale Strongly disagree – strongly agree
	Whether I separate my waste better this year is entirely up to me	
	I should have no trouble separating my waste better this year	
	It is within my power to better separate my waste this year	
	Better separation of waste is impossible for me this year (reversely coded)	
<b>Influence Radboud university</b>	<b>Please indicate whether the following factors influence your choices regarding waste separation</b>	
	Family	This makes it easier to separate my waste
	Relationship	This makes it harder to separate my waste
	Friends	
	Field of education / lectures	No influence
	Side job	
	Student Association	
	Teacher(s)	
	Lay-out / facilities of the Radboud campus	
	Fellow students	
	Otherwise, namely	
<b>System knowledge</b>	Separating waste ensures that less new raw materials are needed.	True / false
	Waste recycling usually requires more energy than the processing of new raw materials.	True / false
	When waste is not separated, it results in more waste being burned.	True / false
<b>Action-related knowledge</b>	Only plastic packaging material is allowed with the plastic waste, so no small plastic items.	True / false
	In order to recycle the separated waste as well as possible, no other types of waste should be included. If a type of waste is too polluted, it is still incinerated.	True / false
	Broken clothing should not be placed in a textile container.	True / false
<b>Effectiveness knowledge</b>	Making new aluminium requires more energy than melting old aluminium, how many times more energy is required?	5
		14
		20
	The recycling of paper and cardboard in the Netherlands means that... trees are saved each year.	4 million
		5 million
		7 million
	Melting glass shards from the glass container requires less energy than melting new raw materials for glass.	20
		32



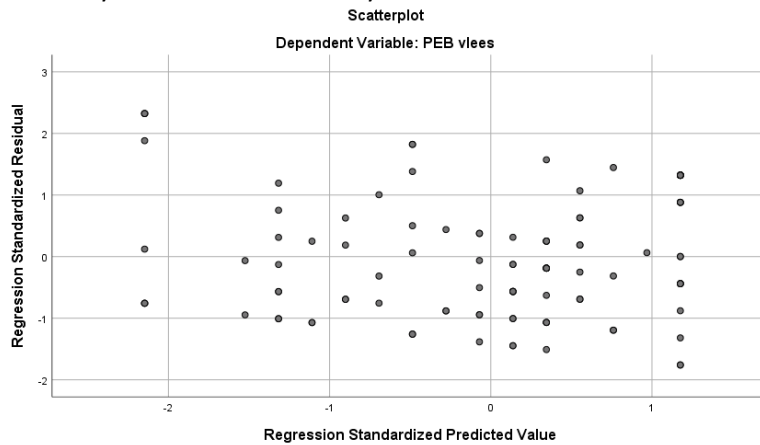
	Glass made from recycled glass saves... percent of energy compared to new glass.	25
<b>Closing</b>		
<b>Environmental concern</b>	<b>Answer per statement to what extent you agree with this</b>	
	Nature's balance can quickly become unbalanced	Five point scale
	When humans interfere with nature, it can have major consequences	Strongly disagree – strongly agree
	Humans are abusing the environment	
	The ecological crisis facing humankind is exaggerated (reversely coded)	
	If things continue on their present course, we will soon experience an ecological catastrophe	
	Humans have the right to modify the natural environment to suit their needs (reversely coded)	
	Humans were meant to rule over the rest of nature (reversely coded)	
	Plants and animals exist primarily to be used by humans (reversely coded)	
	There is no scientific proof for global warming (reversely coded)	
<b>Values - self-enhancement</b>	<b>To what extent are the values below important principles in life for you?</b>	
	Social power (control over others)	Five point scale
	Wealth (money and material possessions)	Very unimportant – very important
	Authority (the right to lead or command people)	
	Influence (having an impact on people and events)	
<b>Values - self-transcendence</b>	<b>To what extent are the values below important principles in life for you?</b>	
	Equality (equal opportunities for all)	Five point scale
	A peaceful world (a world free from war and conflict)	Very unimportant – very important
	Social justice (correcting injustice)	
	Helpful (contributing to the well-being of others)	

## Appendix II: Assumptions regression analysis

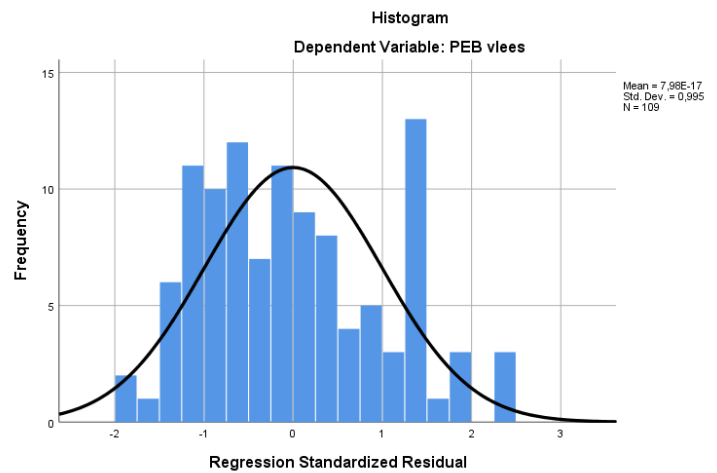
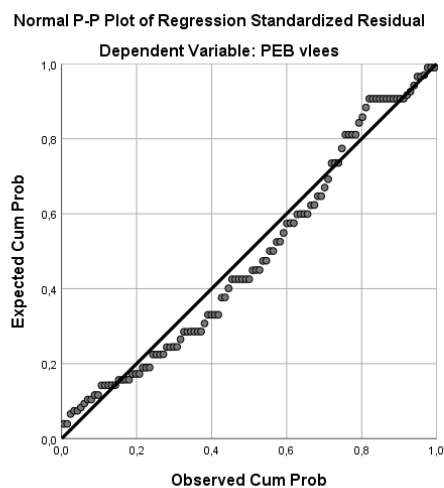
### Reducing meat consumption

#### Intention – PEB

Linearity and homoscedasticity

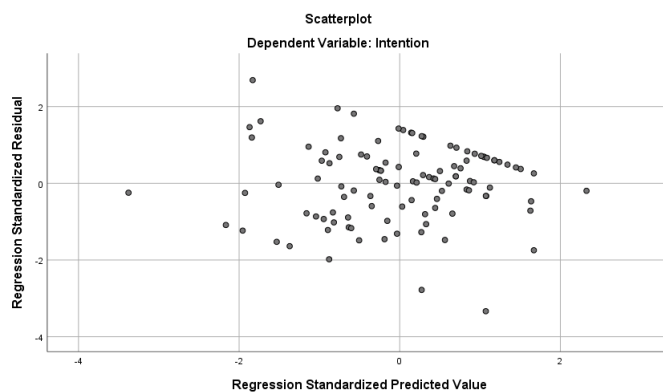


Normality

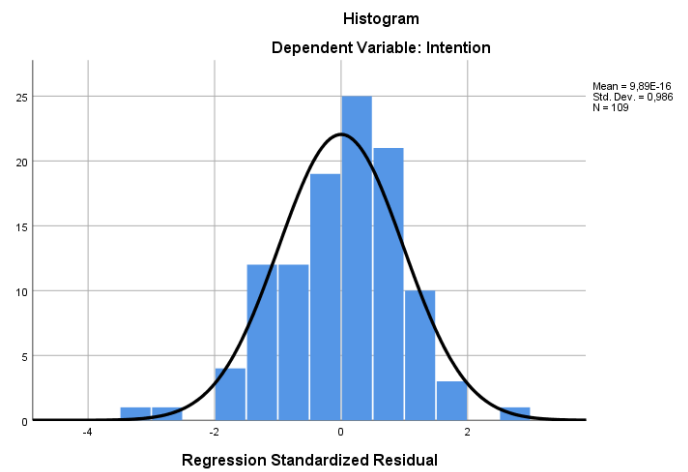
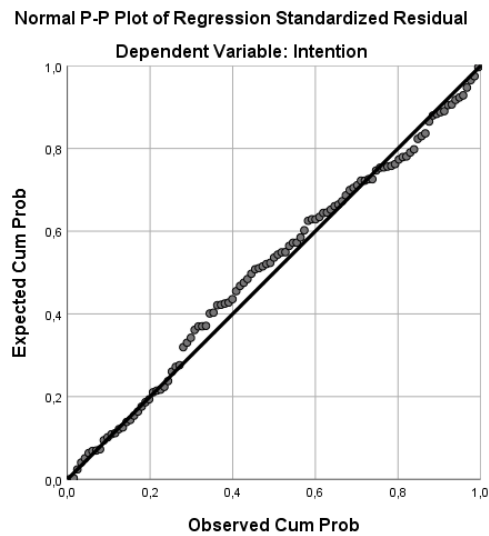


#### Attitude, subjective norm, and PBC – intention

Linearity and homoscedasticity

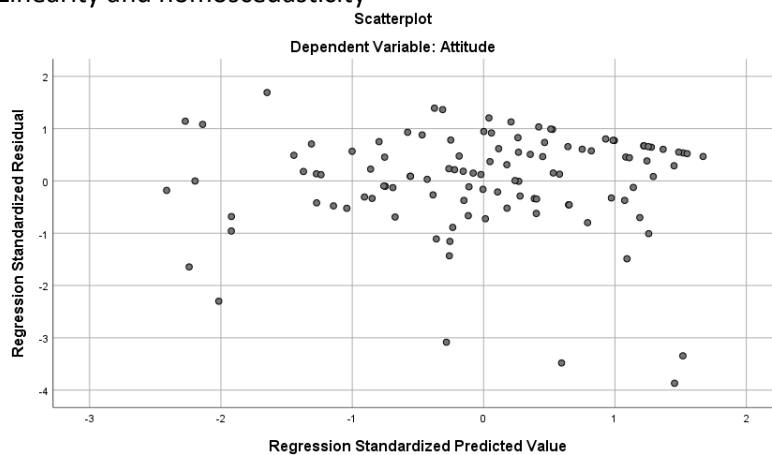


## Normality

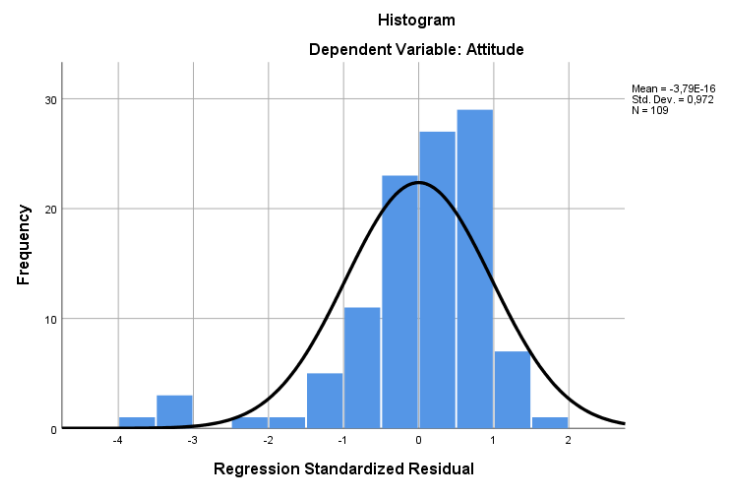
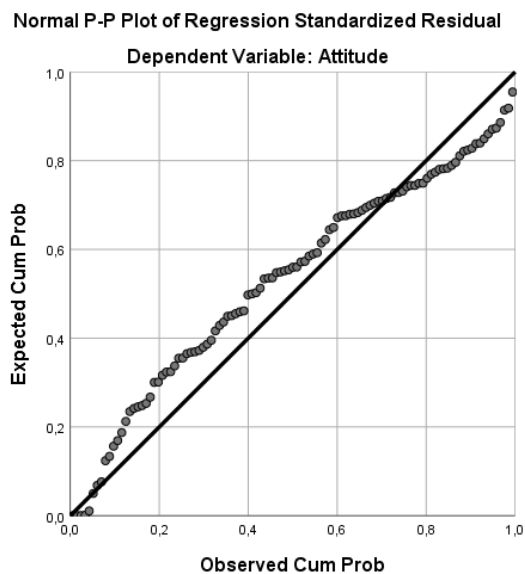


## Values, environmental concern, and the dimensions of environmental knowledge – attitude

### Linearity and homoscedasticity

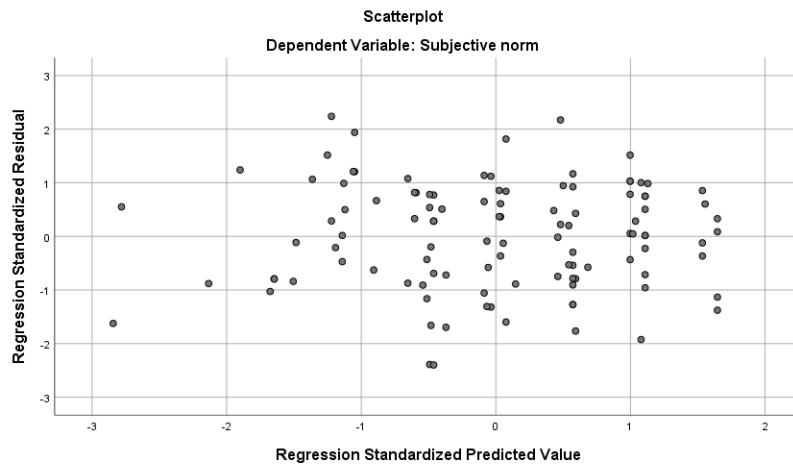


## Normality



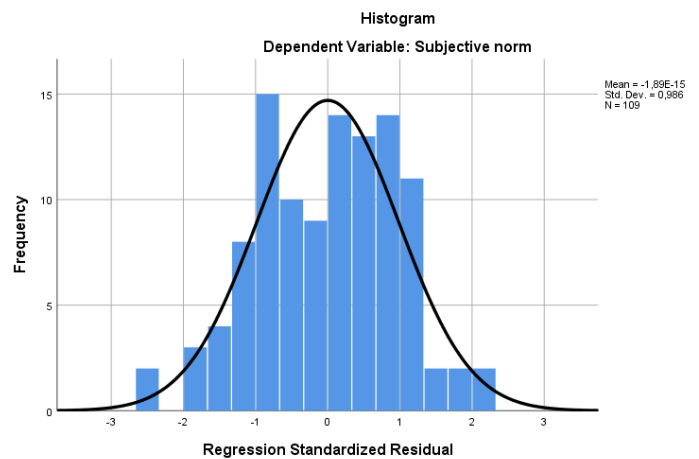
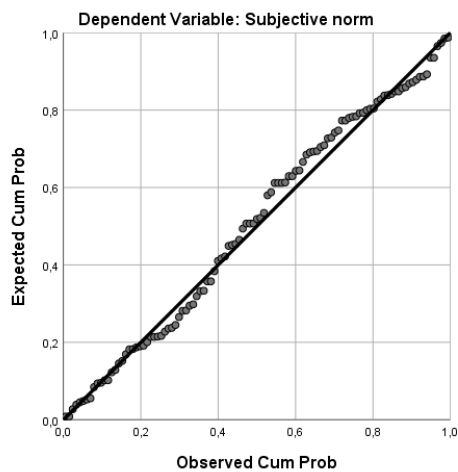
## The dimensions of environmental knowledge – subjective norm

Linearity and homoscedasticity



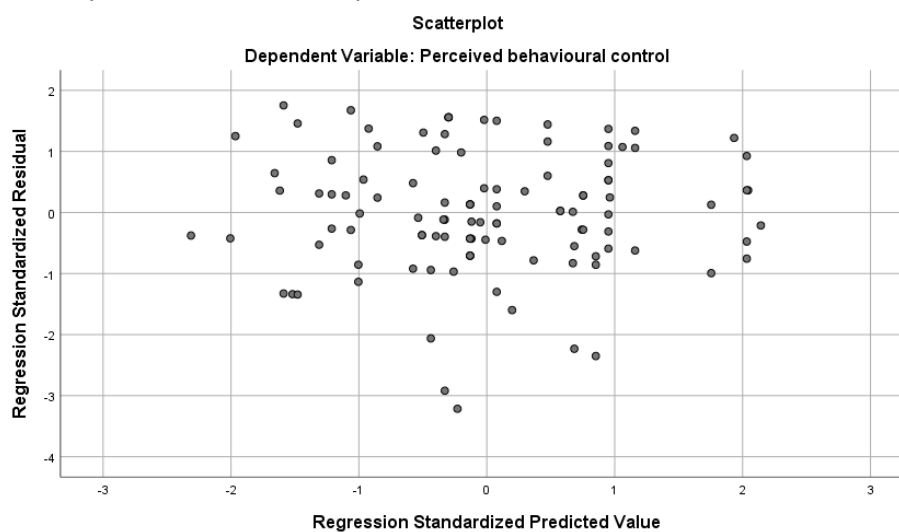
## Normality

Normal P-P Plot of Regression Standardized Residual



## The dimensions of environmental knowledge – PBC

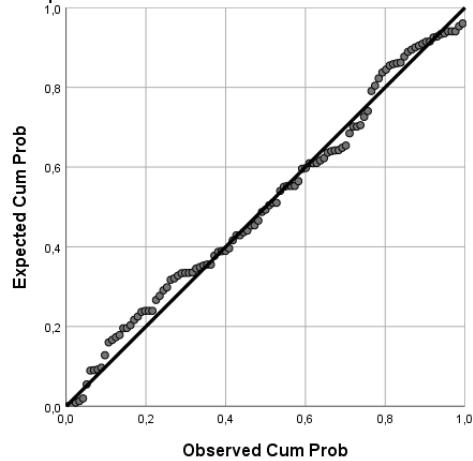
Linearity and homoscedasticity



## Normality

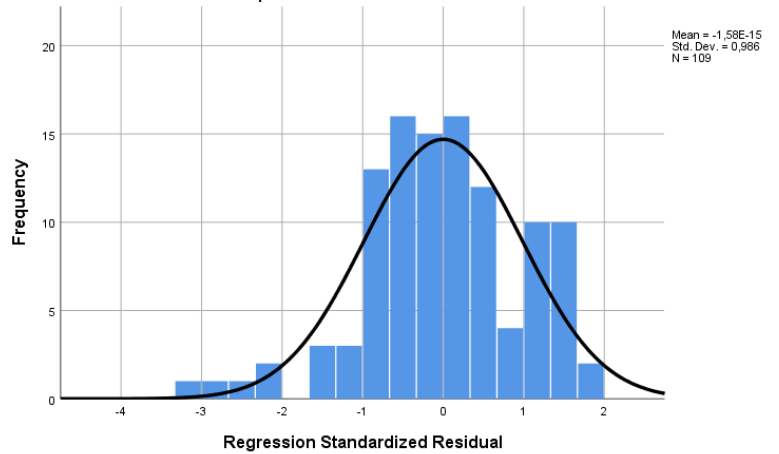
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Perceived behavioural control



Histogram

Dependent Variable: Perceived behavioural control

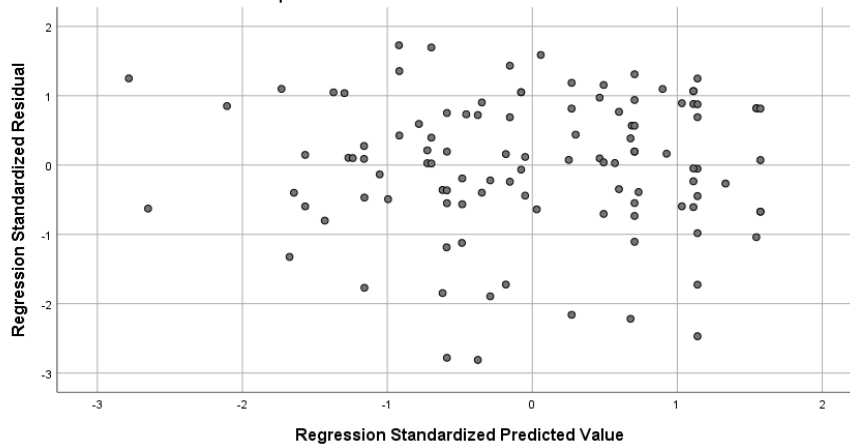


## The dimensions of environmental knowledge – environmental concern

### Linearity and homoscedasticity

Scatterplot

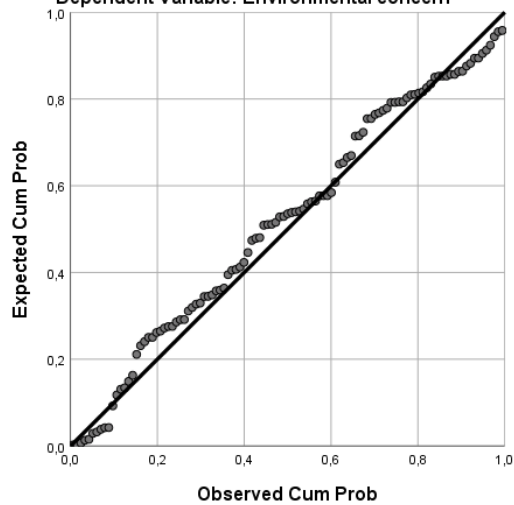
Dependent Variable: Environmental concern



## Normality

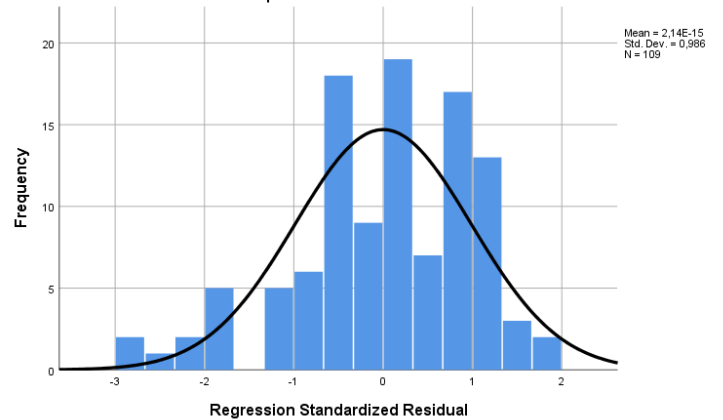
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Environmental concern



Histogram

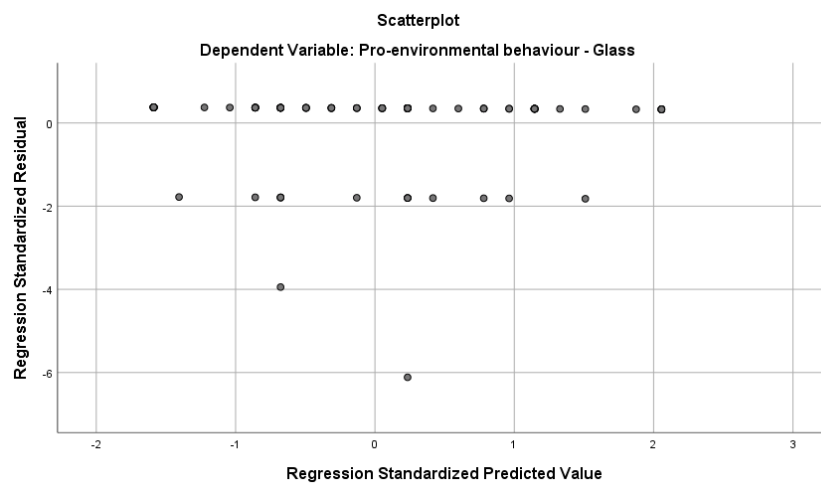
Dependent Variable: Environmental concern



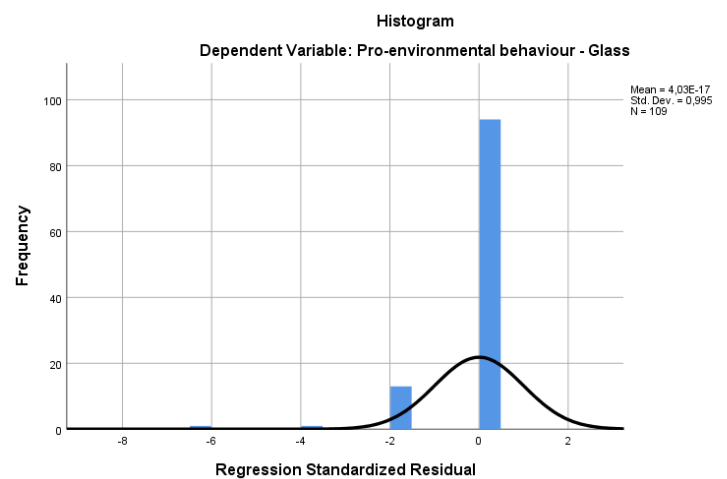
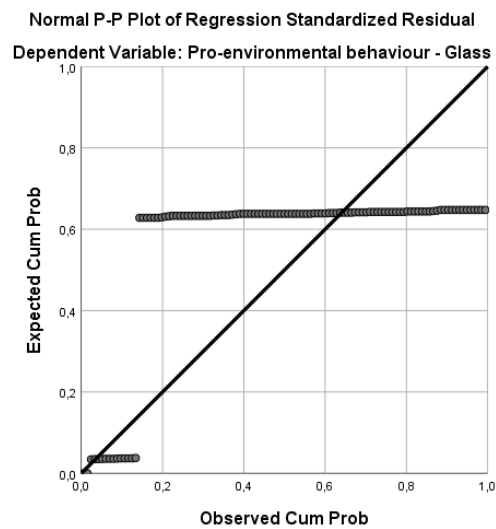
## Separating waste

### Intention – PEB glass

Linearity and homoscedasticity

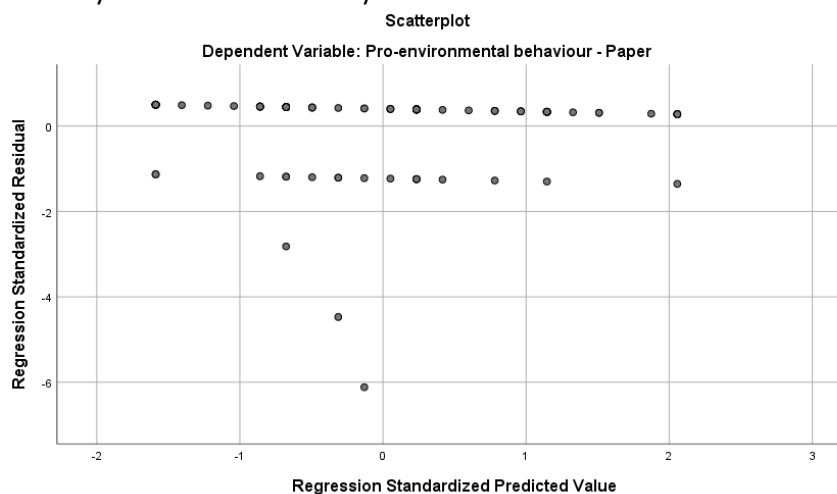


### Normality

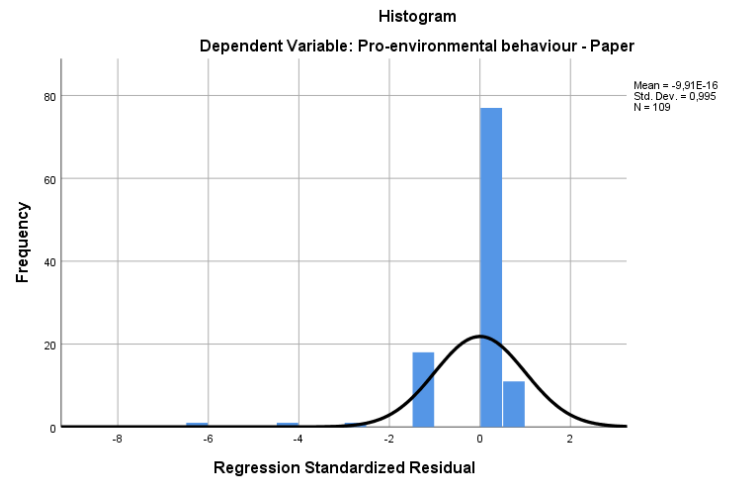
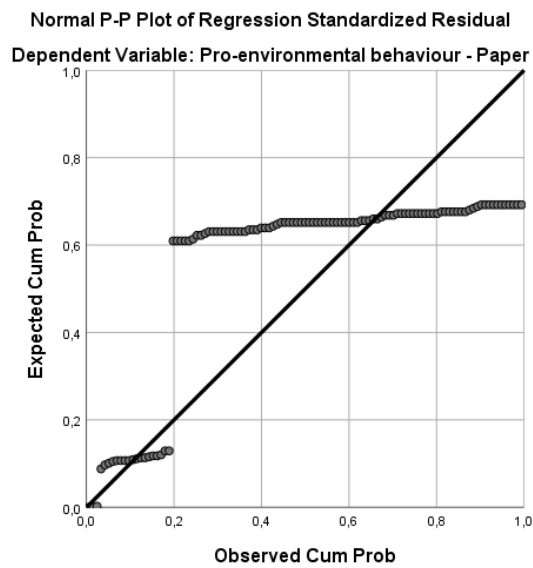


### Intention – PEB paper

Linearity and homoscedasticity

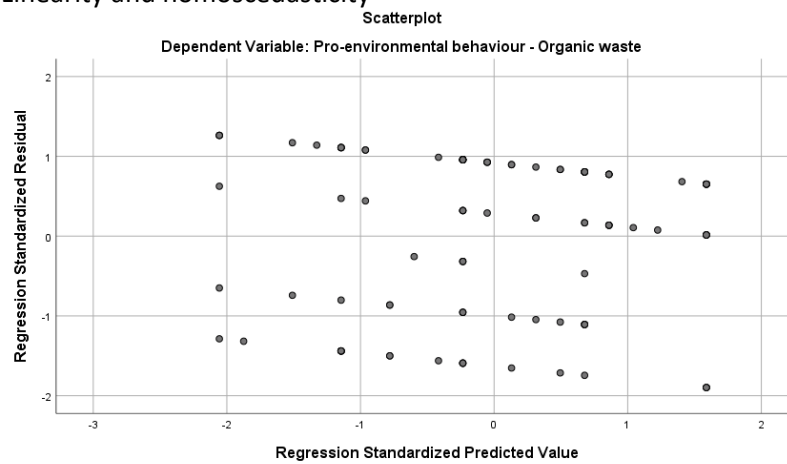


## Normality

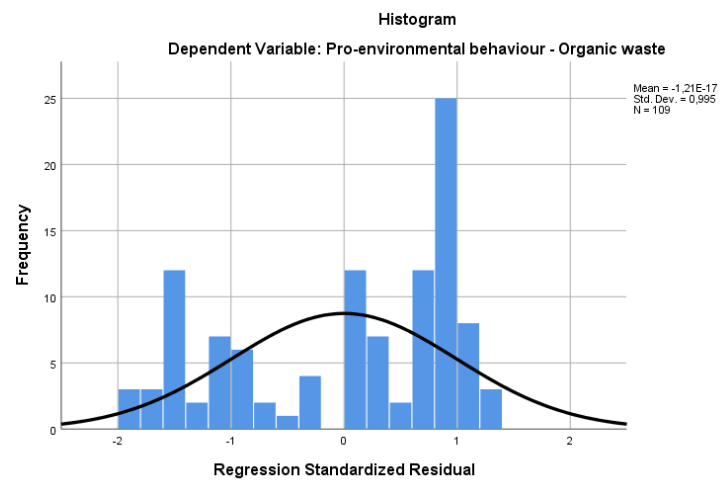
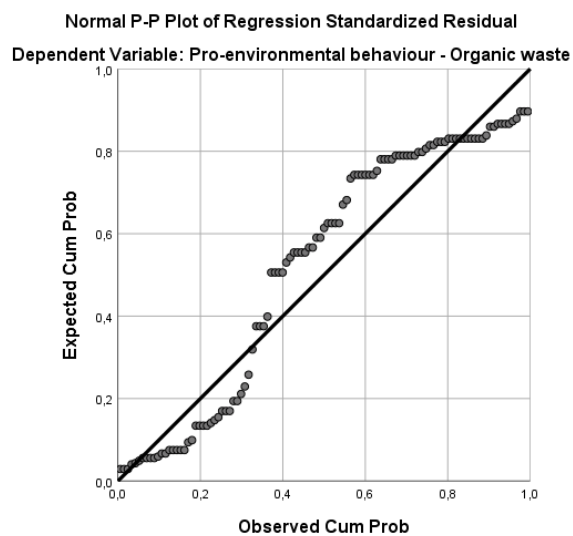


## Intention – PEB organic waste

### Linearity and homoscedasticity

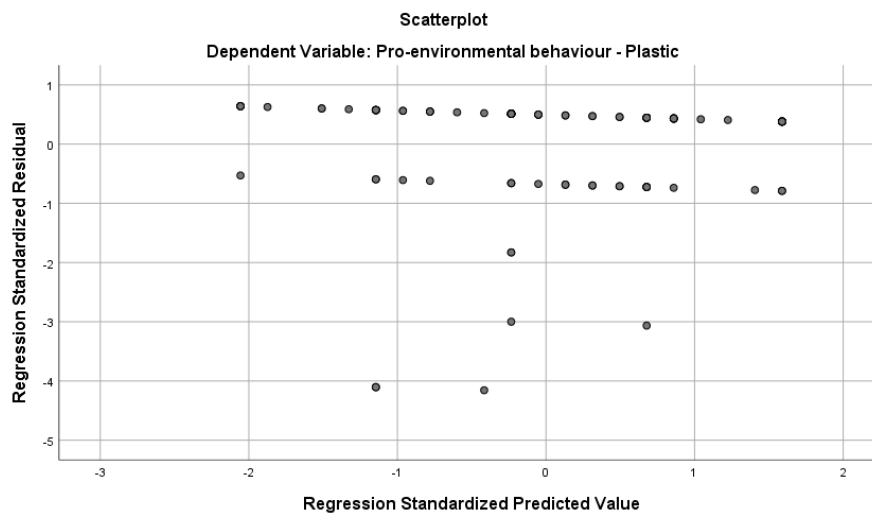


## Normality

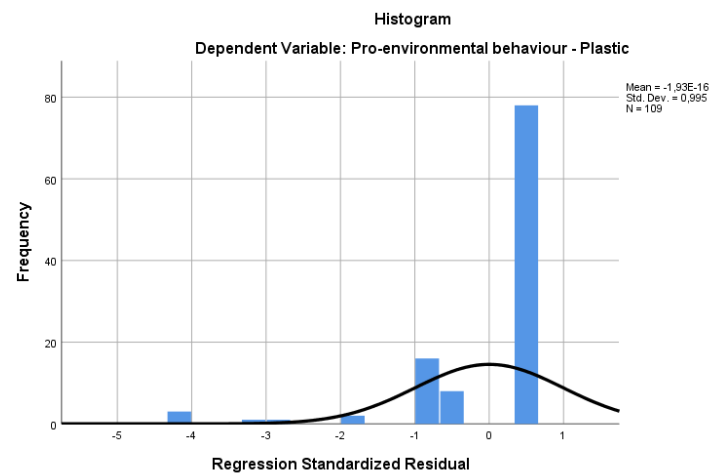
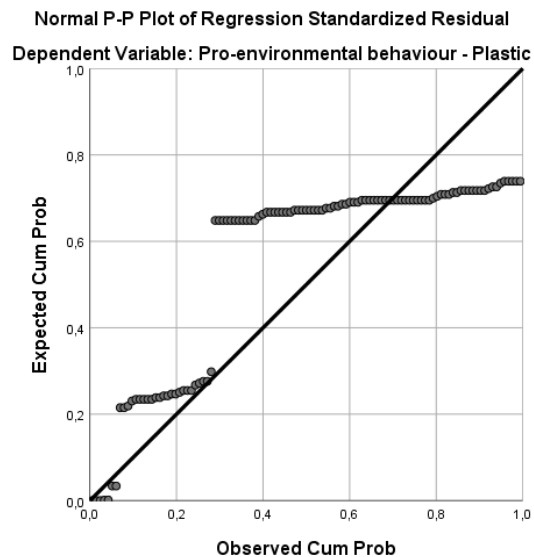


## Intention – PEB plastic

Linearity and homoscedasticity

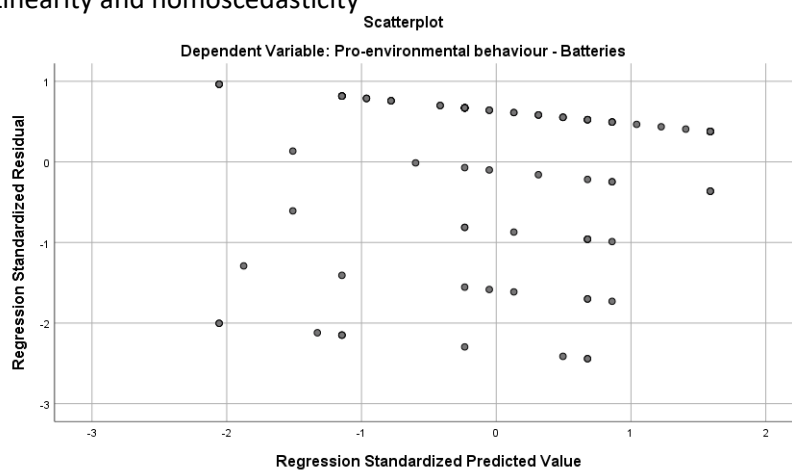


Normality



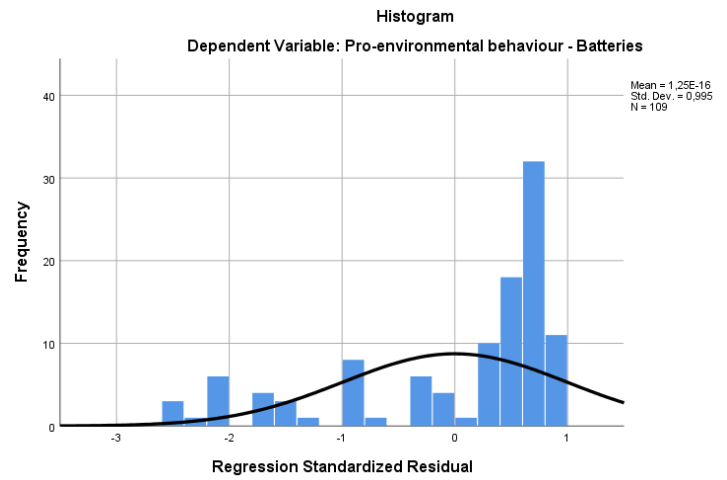
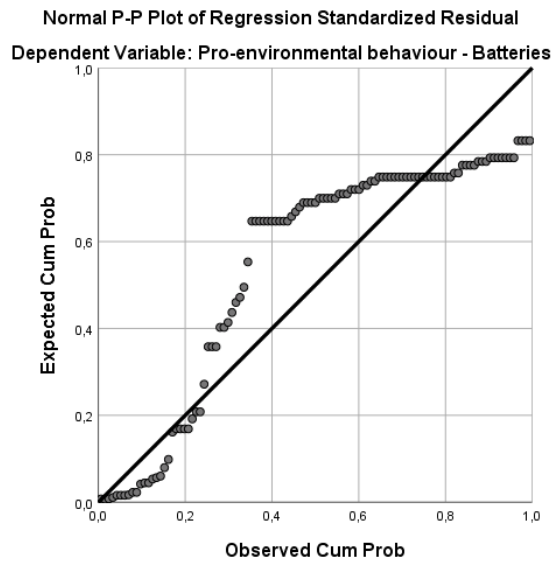
## Intention – PEB batteries

Linearity and homoscedasticity



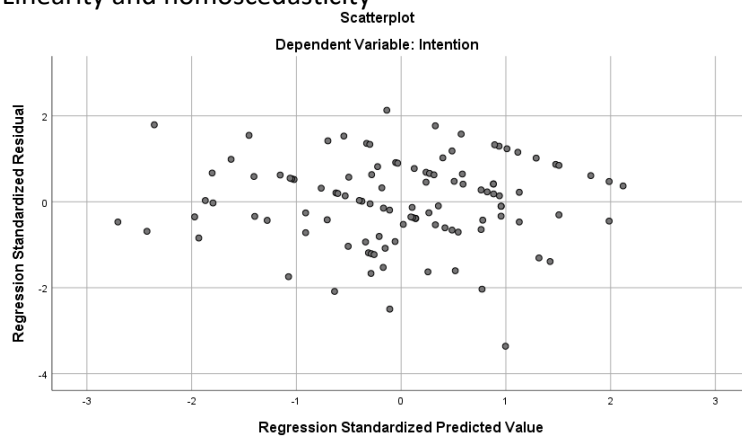


## Normality

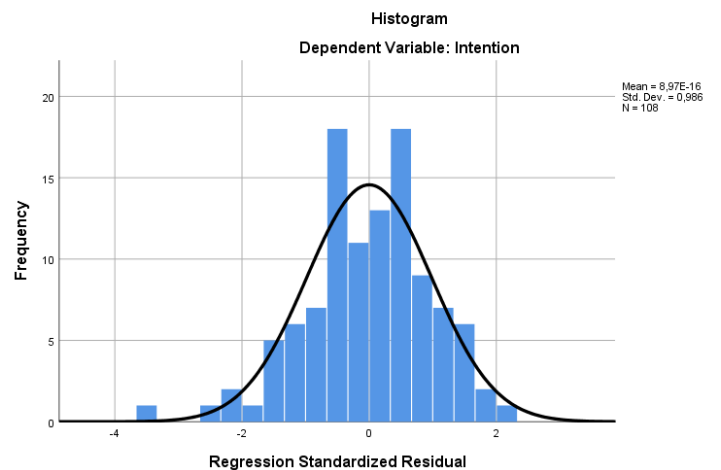
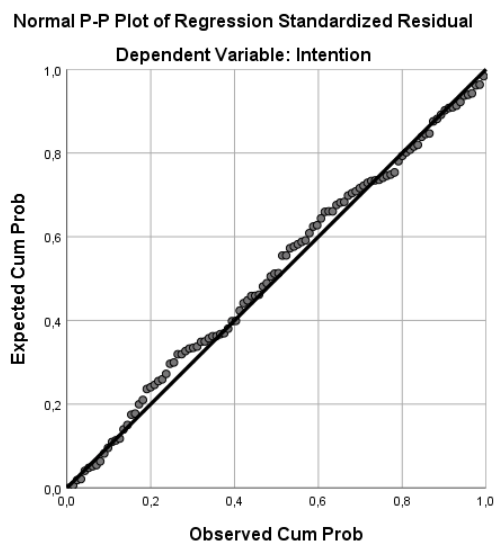


## Attitude, subjective norm, and PBC – intention

### Linearity and homoscedasticity

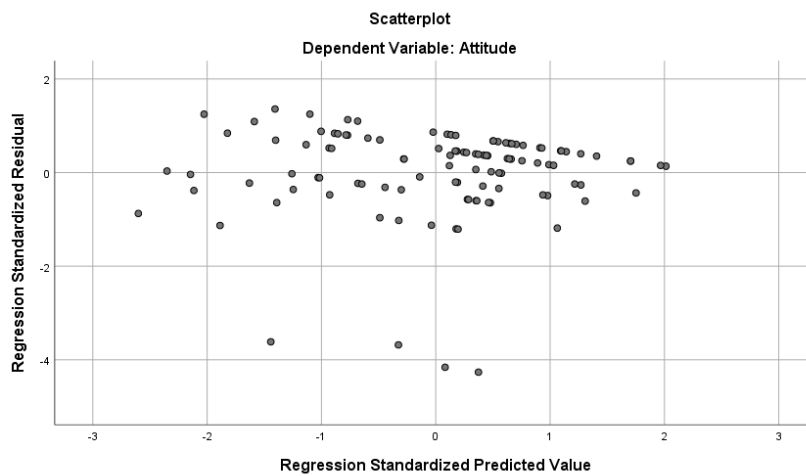


## Normality

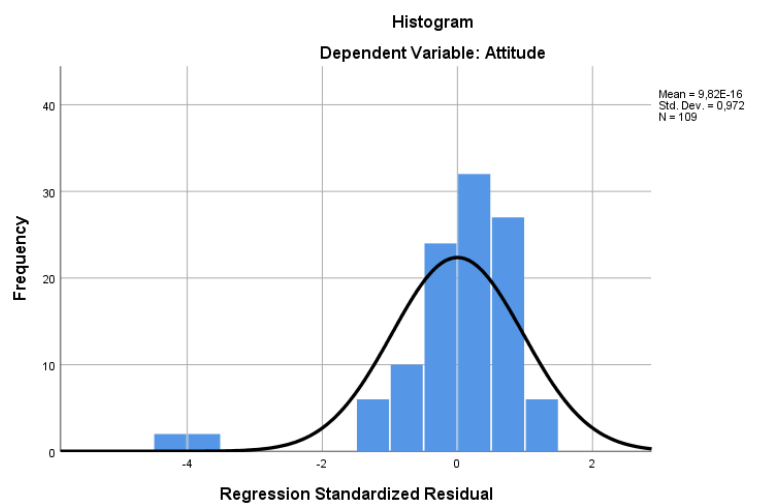
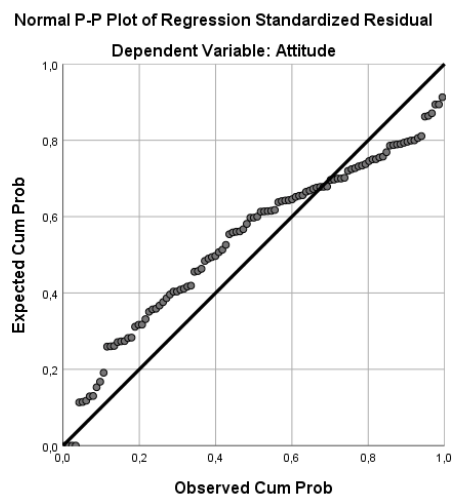


## Values, environmental concern, and the dimensions of environmental knowledge – attitude

### Linearity and homoscedasticity

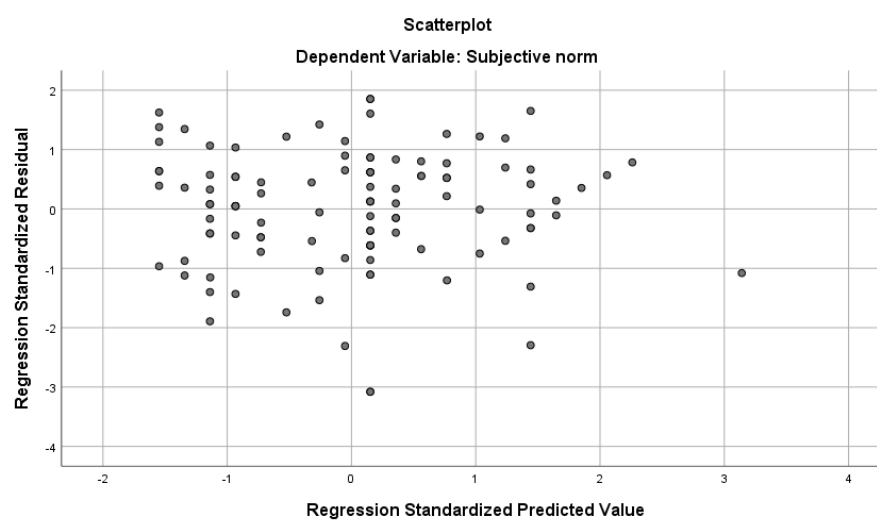


### Normality

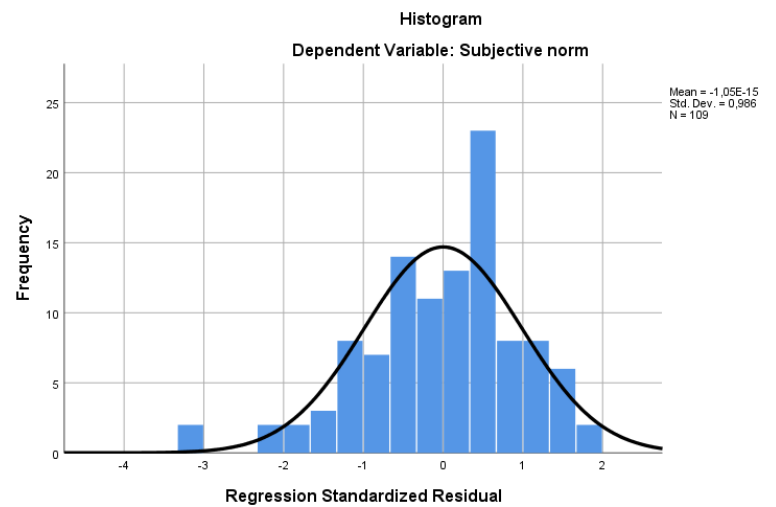
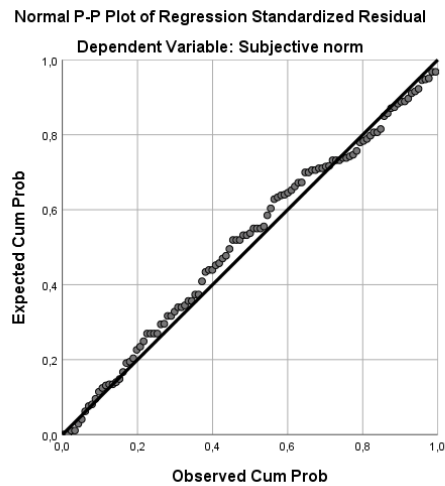


## The dimensions of environmental knowledge – subjective norm

### Linearity and homoscedasticity

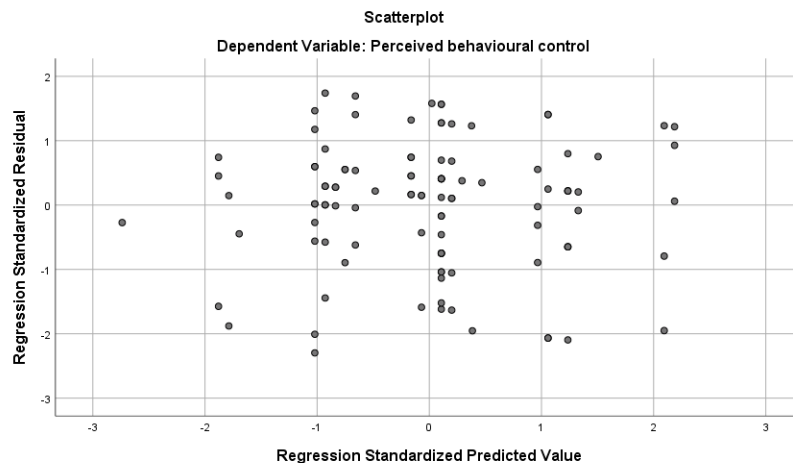


## Normality

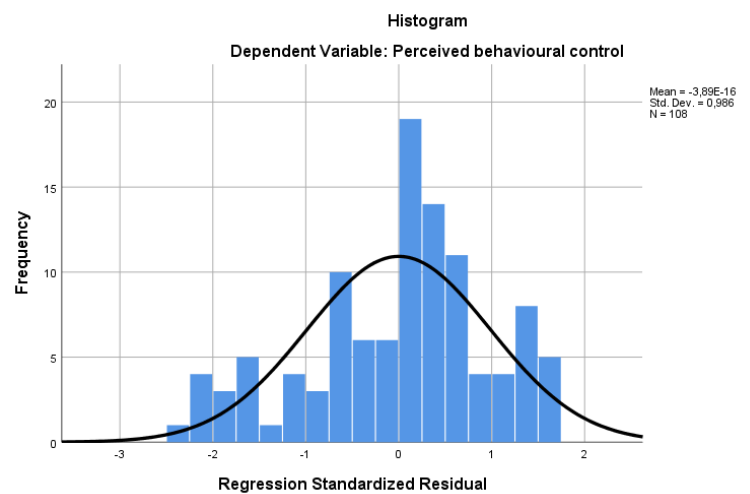
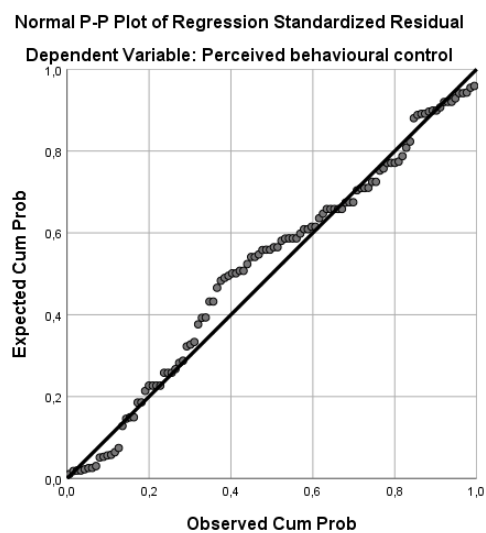


## The dimensions of environmental knowledge – PBC

### Linearity and homoscedasticity

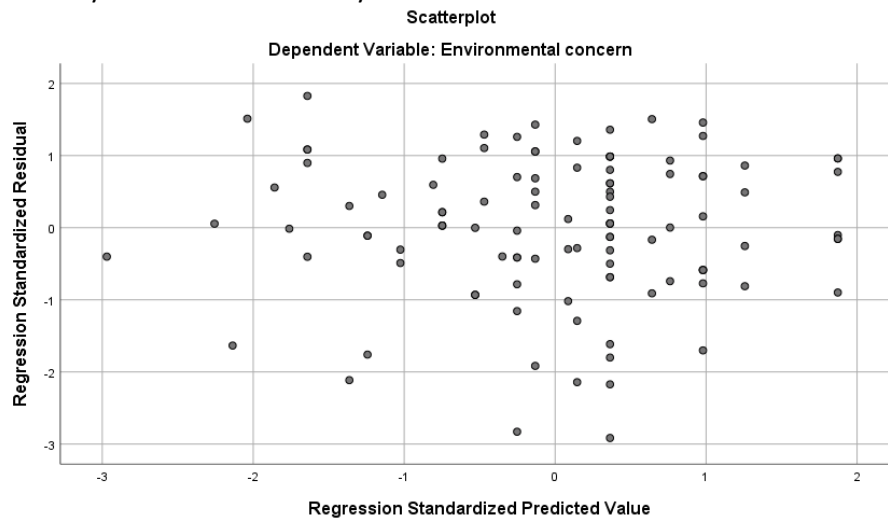


## Normality

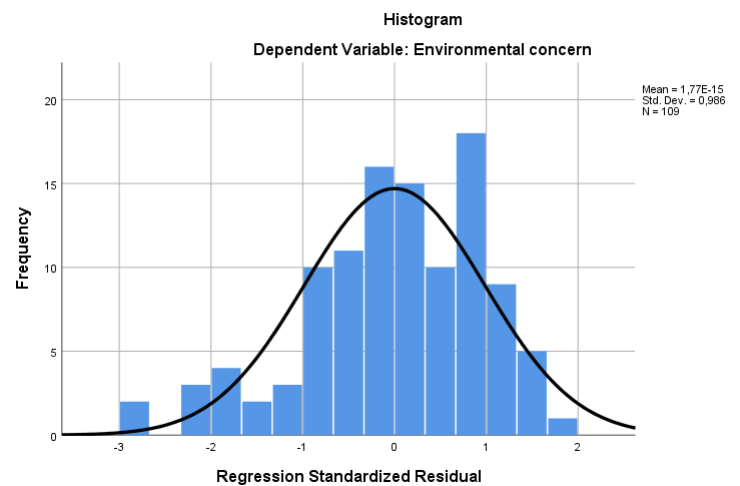
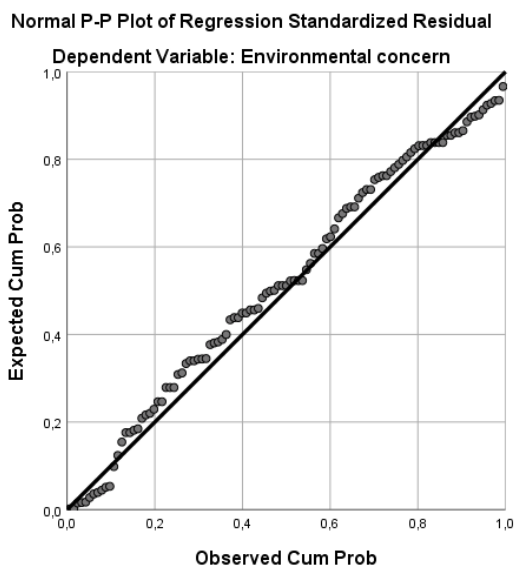


## The dimensions of environmental knowledge – environmental concern

### Linearity and homoscedasticity



### Normality



## Appendix III: Multiple regression

### Reducing meat consumption

#### Intention – PEB

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,290 <sup>a</sup>	,084	,075	2,272	,084	9,804	1	107	,002

a. Predictors: (Constant), Intention

b. Dependent Variable: PEB vlees

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50,608	1	50,608	9,804	,002 <sup>b</sup>
	Residual	552,346	107	5,162		
	Total	602,954	108			

a. Dependent Variable: PEB vlees

b. Predictors: (Constant), Intention

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1,153	,687		1,680	,096					
	Intention	,569	,182	,290	3,131	,002	,290	,290	,290	1,000	1,000

a. Dependent Variable: PEB vlees

#### Attitude, subjective norm, and PBC – intention

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,576 <sup>a</sup>	,331	,312	,99793	,331	17,350	3	105	,000

a. Predictors: (Constant), Perceived behavioural control, Subjective norm, Attitude

b. Dependent Variable: Intention

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51,836	3	17,279	17,350	,000 <sup>b</sup>
	Residual	104,567	105	,996		
	Total	156,403	108			

a. Dependent Variable: Intention

b. Predictors: (Constant), Perceived behavioural control, Subjective norm, Attitude

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,064	,584		-,109	,914					
	Attitude	,163	,121	,131	1,349	,180	,409	,131	,108	,674	1,484
	Subjective norm	,568	,130	,402	4,357	,000	,521	,391	,348	,749	1,335
	Perceived behavioural control	,321	,149	,190	2,150	,034	,360	,205	,172	,816	1,225

a. Dependent Variable: Intention

## Values, environmental concern, and the dimensions of environmental knowledge – attitude

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,422 <sup>a</sup>	,178	,130	,90169	,178	3,684	6	102	,002

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, Environmental concern, System knowledge, Values - Self-transcendence, Values - Self-interest

b. Dependent Variable: Attitude

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17,971	6	2,995	3,684	,002 <sup>b</sup>
	Residual	82,930	102	,813		
	Total	100,901	108			

a. Dependent Variable: Attitude

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, Environmental concern, System knowledge, Values - Self-transcendence, Values - Self-interest

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-,214	1,220		-,176	,861					
	Values - Self-transcendence	,233	,186	,126	1,257	,212	,244	,123	,113	,808	1,238
	Values - Self-interest	,008	,108	,008	,076	,939	-,199	,008	,007	,758	1,319
	Environmental concern	,443	,169	,273	2,624	,010	,339	,251	,236	,743	1,345
	System knowledge	-,055	,111	-,046	-,490	,625	,048	-,048	-,044	,923	1,083
	Action-related knowledge	,470	,229	,192	2,057	,042	,224	,200	,185	,923	1,084
	Effectiveness knowledge	,120	,106	,104	1,132	,260	,149	,111	,102	,950	1,052

a. Dependent Variable: Attitude

## The dimensions of environmental knowledge – subjective norm

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,313 <sup>a</sup>	,098	,072	,82024	,098	3,807	3	105	,012

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Subjective norm

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,683	3	2,561	3,807	,012 <sup>b</sup>
	Residual	70,644	105	,673		
	Total	78,327	108			

a. Dependent Variable: Subjective norm

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1,438	,541		2,659	,009					
	System knowledge	,138	,099	,131	1,389	,168	,182	,134	,129	,962	1,039
	Action-related knowledge	,454	,203	,211	2,238	,027	,240	,213	,207	,971	1,030
	Effectiveness knowledge	,143	,094	,142	1,517	,132	,167	,146	,141	,987	1,013

a. Dependent Variable: Subjective norm

## The dimensions of environmental knowledge – PBC

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,152 <sup>a</sup>	,023	-,005	,71379	,023	,828	3	105	,482

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Perceived behavioural control

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,265	3	,422	,828	,482 <sup>b</sup>
	Residual	53,498	105	,510		
	Total	54,763	108			

a. Dependent Variable: Perceived behavioural control

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,508	,470		7,457	,000					
	System knowledge	,011	,086	,012	,124	,902	,035	,012	,012	,962	1,039
	Action-related knowledge	,090	,176	,050	,511	,610	,060	,050	,049	,971	1,030
	Effectiveness knowledge	,117	,082	,138	1,425	,157	,142	,138	,137	,987	1,013

a. Dependent Variable: Perceived behavioural control

## The dimensions of environmental knowledge – environmental concern

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,143 <sup>a</sup>	,020	-,008	,59770	,020	,732	3	105	,535

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Environmental concern

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,784	3	,261	,732	,535 <sup>b</sup>
	Residual	37,510	105	,357		
	Total	38,295	108			

a. Dependent Variable: Environmental concern

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,523	,394		8,943	,000					
	System knowledge	,055	,072	,075	,762	,448	,096	,074	,074	,962	1,039
	Action-related knowledge	,138	,148	,092	,937	,351	,107	,091	,091	,971	1,030
	Effectiveness knowledge	,037	,069	,052	,537	,592	,065	,052	,052	,987	1,013

a. Dependent Variable: Environmental concern

## Separating waste

### Attitude, subjective norm, and PBC – intention

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
					R Square Change	F Change	df1	df2	
1	,621 <sup>a</sup>	,386	,368	,86850	,386	21,758	3	104	,000

a. Predictors: (Constant), Perceived behavioural control, Attitude, Subjective norm

b. Dependent Variable: Intention

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49,237	3	16,412	21,758	,000 <sup>b</sup>
	Residual	78,447	104	,754		
	Total	127,684	107			

a. Dependent Variable: Intention

b. Predictors: (Constant), Perceived behavioural control, Attitude, Subjective norm

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1,093	,628		-1,741	,085					
	Attitude	,156	,109	,112	1,435	,154	,198	,139	,110	,979	1,022
	Subjective norm	,594	,111	,423	5,356	,000	,505	,465	,412	,949	1,053
	Perceived behavioural control	,434	,099	,343	4,360	,000	,438	,393	,335	,955	1,047

a. Dependent Variable: Intention

### Values, environmental knowledge, and the dimensions of environmental concern – attitude

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
					R Square Change	F Change	df1	df2	
1	,345 <sup>a</sup>	,119	,067	,75204	,119	2,299	6	102	,040

a. Predictors: (Constant), Effectiveness knowledge, Environmental concern, Action-related knowledge, System knowledge, Values - Self-transcendence, Values - Self-interest

b. Dependent Variable: Attitude

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,800	6	1,300	2,299	,040 <sup>b</sup>
	Residual	57,688	102	,566		
	Total	65,487	108			

a. Dependent Variable: Attitude

b. Predictors: (Constant), Effectiveness knowledge, Environmental concern, Action-related knowledge, System knowledge, Values - Self-transcendence, Values - Self-interest

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,273	,920		3,558	,001					
	Values - Self-transcendence	-,052	,156	-,034	-,329	,742	,083	-,033	-,031	,792	1,263
	Values - Self-interest	-,038	,089	-,045	-,427	,670	-,124	-,042	-,040	,779	1,284
	Environmental concern	,044	,142	,034	,313	,755	,072	,031	,029	,731	1,368
	System knowledge	,218	,116	,181	1,888	,062	,202	,184	,175	,938	1,066
	Action-related knowledge	,282	,108	,250	2,617	,010	,243	,251	,243	,945	1,058
	Effectiveness knowledge	,128	,101	,123	1,266	,208	,136	,124	,118	,922	1,084

a. Dependent Variable: Attitude



## The dimensions of environmental knowledge – subjective norm

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,156 <sup>a</sup>	,024	-,003	,81094	,024	,874	3	105	,457

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Subjective norm

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,725	3	,575	,874	,457 <sup>b</sup>
	Residual	69,051	105	,658		
	Total	70,776	108			

a. Dependent Variable: Subjective norm

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,516	,399		8,822	,000					
	System knowledge	-,026	,123	-,021	-,212	,833	,007	-,021	-,020	,969	1,032
	Action-related knowledge	-,052	,113	-,044	-,458	,648	-,052	-,045	-,044	,997	1,003
	Effectiveness knowledge	,163	,107	,150	1,528	,130	,148	,147	,147	,967	1,034

a. Dependent Variable: Subjective norm

## The dimensions of environmental knowledge – PBC

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,168 <sup>a</sup>	,028	,000	,86391	,028	1,002	3	104	,395

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Perceived behavioural control

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,243	3	,748	1,002	,395 <sup>b</sup>
	Residual	77,620	104	,746		
	Total	79,863	107			

a. Dependent Variable: Perceived behavioural control

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,276	,425		7,710	,000					
	System knowledge	-,013	,131	-,010	-,102	,919	,012	-,010	-,010	,969	1,032
	Action-related knowledge	,124	,120	,100	1,033	,304	,093	,101	,100	,997	1,003
	Effectiveness knowledge	,163	,114	,141	1,436	,154	,134	,139	,139	,967	1,034

a. Dependent Variable: Perceived behavioural control

## The dimensions of environmental knowledge – environmental concern

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,142 <sup>a</sup>	,020	-,008	,59784	,020	,715	3	105	,545

a. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

b. Dependent Variable: Environmental concern

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,767	3	,256	,715	,545 <sup>b</sup>
	Residual	37,528	105	,357		
	Total	38,295	108			

a. Dependent Variable: Environmental concern

b. Predictors: (Constant), Effectiveness knowledge, Action-related knowledge, System knowledge

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3,697	,294		12,582	,000					
	System knowledge	,094	,090	,102	1,036	,303	,088	,101	,100	,969	1,032
	Action-related knowledge	,075	,083	,087	,904	,368	,088	,088	,087	,997	1,003
	Effectiveness knowledge	-,052	,079	-,065	-,659	,511	-,052	-,064	-,064	,967	1,034

a. Dependent Variable: Environmental concern